COAL AGE

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The Individual Should Heed the Government's Example.

Waste Not--Want Not

FOR some time, now, the question of conservation has been receiving a great deal of attention on the part of our two national law-making bodies—conservation of forests, of mineral resources, of water powers, etc.

It has been deemed imperative, in order to retain the present prosperity and well-being of the country as a whole, and to insure that the very arteries that supply life to our commonwealth be not sclerosed prematurely, to pass laws prohibiting the wanton waste of the country's inherent advantages.

Why does not the individual take example from the Government and himself lay down hard and fast laws to be followed in the harboring of *his* resources?

The greatest obstacle in the path to advancement and success of the average worker today is waste; and the most valuable quality wasted is time.

Everybody is aware that for the wage earner the element of time is divided into three divisions—work, recreation, rest. But only a few are alive to the realization that from each of these divisions flows a little stream made up of wasted moments. And these little streams, flowing on through life merge into one swiftly moving current of lost golden hours—hours that can never be reclaimed.

The place to dam this River of Wasted Hours is at the source. You cannot hope to check its onward rush at the middle, much less at its end, where it broadens out into a whirlpool that gently sucks you into a vortex of mediocrity.

If you are a waster, you must cut out the waste. When at work give of the best that is in you. Continually strive, setting up goal after goal. The ladder is high and the rungs are many—and slippery. If you are giving your employer only six hours of effort—and that half-hearted—out of the eight you are being paid for, you are wasting two hours of constructive endeavor every working day. How can you hope for advancement?

When at leisure make the most of it. If your work keeps you away from the sunshine and the fresh air the greater part of the day, all the more reason why your spare time should be spent out in the open as much as possible, and not in the fume and smoke-laden atmosphere of the nearest saloon. And if out of your leisure you cannot find time for at least one hour of upbuilding study a day, thus fitting yourself for a more responsible position, how can you hope to succeed?

The harder a man works, the more he should value his hours of rest. Hours that are spent in dissipation, instead of in laying up a store of energy for the morrow's tasks, are wasted hours. They are hours that leave the workman heavy-eyed, dull, lethargic. How can such a one hope to get on?

Harbor your resources. Be like the athlete who wins a long-distance race. At the start he runs guardedly, keeping his mind on the goal. He saves his energy throughout for the final sprint. If he had wasted his resources at the outset, he would not have crossed the tape a winner.

We Must Cut Out the Wasted Hours.

By Alex Moscovitz

Electric Mine Haulage

By C. M. Means*

SYNOPSIS—The development of electric mine haulage has been rapid. The actual efficiency of such a transportation system is extremely low, and any considerable savings that may be made must arise from improved dispatching rather than from better machinery.

In this article only traction haulage by the use of electric locomotives is considered.

Underground electric haulage has been in successful operation for the past 20 years, and even prior to that time some fairly satisfactory results were attained.

Progress has been continuous during this period and is still going forward at a rather rapid rate. This development has been owing to new and better designs of equipment suitable to mining work and a more intelligent application of the equipment available to the work to be done in the mines. This system of haulage has evolved roadways and methods of mining that lend themselves readily to this manner of transportation.

The equipment first used in mines was an adaptation of its predecessor, the street railway, but with the growth of the industry equipment was specially designed for this particular work. New and special devices were incorporated, arranged to meet the different conditions encountered in mines. Improvements are still being made and the application is being extended each year.

Haulage Represents Small Percentage of Costs

With any method of handling coal underground the item of haulage is a rather small percentage of the total cost of production of a ton of coal. It represents, however, one of the items that can be varied by applying different methods, and a material reduction in costs can quite often be effected by a careful study of conditions and a proper application of equipment designed to do certain work.

The haulage system has quite an important bearing on other costs that occur in producing coal and which are not directly a part of the haulage system. Because of the high speed and flexibility of its operation, it is possible to do intensive mining, thereby reducing the active area in the mine with a less ventilation cost, smaller trackage, easier supervision, and in many cases it permits of greater recovery.

The haulage systems in use today make possible large outputs. Furthermore, in many cases instead of a haulage system being fitted to a mine, the mine is arranged and operated to suit the haulage.

The matter of track friction is important, and most mining men realize that there are material advantages in a good track. Few, however, really comprehend the reduction in power requirements that can be effected on much-used roads by making a strictly first-class track in every respect. When we consider that it is possible to have a track friction as low as 12 lb. of drawbar pull per ton, while many roads show as much as 40 lb. per ton, it is apparent that this is an extremely important item. The use of heavy rails is an essential feature, but it is even more necessary that the track be kept clean. The friction of the journals on mine cars has been pretty well solved in the past few years by improved trucks and bearings.

The locomotive represents considerable dead load to be hauled at all times, and considerable energy is used in handling this equipment. This cannot materially be improved upon. Further increase in the efficiency of the electrical equipment that may reasonably be expected will be a small item. The tractive effort exerted by a locomotive changes slightly with wheels of different materials, but in general is directly proportional to the weight of the machine.

The actual efficiency of a haulage system, when input power is compared with actual work in delivering coal from the face of the workings to the shaft bottom or tipple is extremely low.

While it is well to consider the economical use of power at all times, it represents only a small percentage of the haulage costs and in most cases is not susceptible of material improvement.

The real reduction in haulage costs comes from so arranging the work that each piece of equipment is operated to its maximum capacity at all times. This is the really difficult problem to solve, as it is interlocked with methods of mining, drainage and ventilation, and the solution can only be worked out by men having an intimate acquaintance with the conditions surrounding any specific problem under consideration.

In general small locomotives are more satisfactory than large ones. By small locomotives are meant those weighing from 5 to 10 tons. There are a number of 15-ton four-wheeled locomotives in fairly satisfactory service, and a few of this type weighing 20 tons are in use. Because of track conditions locomotives weighing 15 or 18 tons should have six wheels. When it is desirable to use machines underground weighing 20 tons or more, the best results are obtained by using two four-wheeled units connected in tandem.

Large Locomotives in Special Cases

In a few special cases it is economical to use locomotives weighing around 30 tons, in which case it is advisable to employ two units connected in tandem and operated with a contactor type of control, as a drum controller for handling the large currents required becomes unwieldy or unreliable.

It is questionable whether a 30-ton locomotive can be successfully operated from a 250-volt trolley because of the difficulty of collecting the large amount of power required from a single wire. In general when the size of the locomotive exceeds 15 tons, current at 500 volts should be used to secure good results.

The capacity of motors used on locomotives is an important item and one difficult of solution. If a locomotive could be designed for one particular cycle of operation and used accordingly, quite satisfactory results could be secured. As it happens, but few underground roads are at all permanent, which means that locomotives must be equipped with motors best suited for average conditions.

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This has resulted in the use of motors of rather high horsepower rating. In some cases this is an advantage, but in others it is a distinct disadvantage.

A locomotive for gathering purposes may be of the ordinary trolley type with or without cable reel or crab, or may be of the storage-battery type. The trolley locomotive without cable reel or crab is applicable only in mines where cars are handled to and from the face by the men. This arrangement is suitable to a few thin-vein mines, but has no general application.

Locomotives fitted with cable reels can handle cars from roadways to the face quite successfully from a mechanical standpoint, and in some cases economically. To be a good commercial proposition it is necessary to have a large number of working places on an entry, and in many mines the conditions are such as to make such an arrangement impracticable. When this cannot be done animal power will usually show a saving.

A locomotive fitted with a crab has a limited application and is only valuable where grades are severe, but as a general proposition need not be considered. It is generally found more economical to use small hoists for this purpose because of their low cost as compared to a locomotive.

The storage-battery locomotive looks promising, but there is room for improvement before it will be entirely satisfactory for all classes of gathering work.

It is not within the province of this paper to discuss the storage-battery locomotive in detail, but inasmuch as it is making considerable headway its use must be considered. There is a large amount of development work to be done before this class of equipment can occupy the important position accorded the trolley machine. The storage-battery locomotive really occupies a separate field, and there is much to learn as to its economical application. A large part of the development work devolves upon the battery manufacturers, but if past results are a criterion for the future, we will eventually have a battery that will meet the demands imposed by mining service. The successful and economical application must be worked out by the user. It is reasonably certain, however, that in the future the storage-battery locomotive will be of material benefit in the underground transportation of coal.

In most large mines and many smaller ones will be found areas where the voltage regulation is bad. But where a locomotive remains for only short periods of time in such areas, this condition is not serious and does not materially affect the efficiency of the haulage system. Extreme low voltage may materially affect the results attained by reducing the number of cars hauled, in which case some remedy should be applied that will allow full trips to be handled at all points.

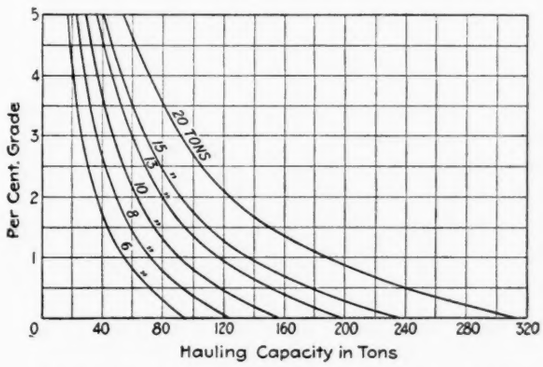
It is important, however, that reasonably uniform and proper voltage be supplied to all main haulage roads. It is a well-known fact that the series motor as used on locomotives is a rugged device, but it will not afford satisfactory service when supplied with current of a widely fluctuating or extremely low voltage.

Where the voltage regulation of a trolley system is bad, a separate circuit should be used for supplying power to mining machines and stationary motors, inasmuch as the conditions of operation of this class of equipment is somewhat different from that of locomotives.

It is well recognized that a track return is the weakest part of the system if bonded rails alone are used for this return. This weakness is occasioned by the fact that the rails are small, affording poor contact between copper and iron, and because of the difficult conditions under which bonding must be applied, inspected and maintained.

It is always advisable to use all available tracks for return circuits where a grounded system is used. In certain cases such as rope roads on slopes it is advisable to run a copper return in addition to bonding the track, connecting the return wire to the rails at frequent intervals.

All joints in track should be bridged with an electrical conductor that insures a path of low resistance for the return circuit. This may be effected by drilling holes in the ends of the rails and applying a copper bond. The connection between the rail and copper is difficult to maintain because of the dissimilarity of the metals and the vibration of the track under moving trips. These bonds may be of the flexible, compressed or driven-pin



HAULING CAPACITY OF MINE LOCOMOTIVES
Car friction, 30 lb. per ton. Steel tires

variety, or in certain cases the channel-pin type of bond. The latter type has little to commend it except cheapness.

Still another method is to use a short piece of copper wire at each end of the splice bar, attaching one end of each piece of wire to the splice bar and the other end to the rail by brazing with the oxyacetylene process. This method is at present in the experimental stage and may or may not have merit. In all probability it is destined to go the way of many preceding experiments. Whatever the scheme of bonding joints may be, it is also essential that crossbonds be applied at short intervals connecting the opposite rails electrically. In general the return circuit of a grounded system calls for a large amount of attention, and even when watched closely is the most troublesome part of such an electrical installation. Where metallic pipe lines parallel a bonded track for a considerable distance they should be electrically connected to the common return at frequent intervals.

The trolley system is an extremely important part of any haulage arrangement, and upon the care with which its details are worked out depends the degree of success that will attend the installation.

It is not only necessary to have a conductor of proper size, but the support must be such as to assure operation at high speeds without the trolley leaving the wire. Each time a wheel leaves the wire time is lost, and while one occurrence may not be serious, repeated occurrences prove costly because of lost time.

The maximum size of trolley wire for mechanical reasons is limited to 4/0, and it is this size that should be employed on all regular runs. This applies with equal emphasis regardless of the voltage used.

On short temporary roads 2/0 trolley can be used advantageously, and in a few cases 1/0 wire may be employed for short, easy hauls if the potential is 500 volts. The question of the carrying capacity of trolley wires and, for that matter, bare feeder wires, has received but little consideration. There are no tables showing the amount of current a bare wire will carry, neither are there any formulas in use covering this subject.

In general the carrying capacity of a trolley line is regulated by the loss of voltage that can be tolerated rather than the heating effect. The carrying capacity of insulated wires is based on the temperature the insulating material will stand without serious deterioration. In the case of bare wires there is no insulation to be affected, so the carrying capacity can be anything but should be limited to such an amount that the resultant temperature of the wire will not ignite wood. This is simply a precaution, assuming that such wires may sometimes come in contact with timbers. This limit is so high, however, that it is seldom met with in actual practice.

All trolley lines should have an automatic current-rupturing device that will positively operate in case of a complete short-circuit on any part of the system, as it is bad practice to have a system where a short-circuit simply imposes a load on the power plant, owing to the energy required to heat conductors in the circuit. It is a well-known fact that many mines have such a condition existing, and it is equally well known that a large amount of trouble is directly traceable to this condition.

The consensus of opinion is that grooved trolley wire has certain advantages over other shapes, but the matter of the shape of cross-section only affects the facility of handling, and no special advantages accrue from the use of grooved trolley wire as compared to figure 8 or round conductor. Flashing and burning at supports is a little more marked with round wire, owing to the design of the ears required to properly support it.

Manner of Trolley Support Is Important

The really important question with respect to the mechanical features of the trolley line is not one of shape, but of manner of support. All trolley wires should be kept taut and in a reasonably straight line on tangents, and on all curves the supports should be sufficiently close together so that in case the wire should come out of one of the hangers it can be safely used until it is repaired. With supports so placed there is much less danger of accident than if the spacing was greater. The height of the trolley wire should be reasonably uniform and not more than 20 per cent. above or below the average elevation.

The relatively important place that the haulage system occupies in the operation of a mine makes it imperative that it be given constant supervision by competent men. It represents a continually changing factor, and frequent examinations and tests should be made and all parts of the equipment kept in good uptodate condition. In many cases it is in the interest of economy to scrap old equipment and purchase new.

Better equipment is available each year, and new and improved methods of mining are being introduced. It is not enough to wait until equipment is worn out to discard it, but just the moment new equipment or new methods show an economical advantage they should be installed.

Because of its connection with other operations in mining the item of haulage should be examined from every angle and its relation to other factors carefully considered.

Missouri Mine Inspectors' Report for 1915

From the 1915 Missouri Mine Inspectors' Report we cull the following information: The total coal output for 1915 was 3,744,394 tons, a decrease of 96,059 and 265,842 tons from the years 1914 and 1913 respectively. To produce this coal 265 mines were operated with 7,175 miners and 1,750 laborers, which gives an average of 419 tons per man underground. The largest county production came from Lafayette County, in which 50 mines furnished 869,740 tons of coal, an average of 17,394 tons per mine. The total output of this county is exceeded by several mines to the eastward. However, before making comparisons, it is to be understood that the coal is mined from a bed which averages less than 2 ft. in thickness, only one mine in the county having a 4-ft. bed.

With the exception of the Waverly and two smaller mines all the mining of coal is done by the longwall method and without the use of powder. Of the total output, 709,777 tons was mined by machines and 145,298 tons by picks. Machine runners received $3.06 per day and their helpers $2.84. Pick miners received an average of $1.69 per ton for coal, although the wages varied in longwall mines from $1.21 to $2 per ton. The Waverly mine, which is worked by pillar and room, used 1,215 kegs of the total 1,217 kegs of powder consumed in the county.

The one mine in Harrison County produced 89,472 tons of coal, employing a total of 155 men and consuming 6,024 kegs of powder. The one mine in Platte County produced 89,981 tons of coal with 252 men and used no powder, it being worked by the longwall method.

The tabulated fatal accidents number 17, but under the heading of Fatal Accident five more are given. The inspectors leave the latter out of the table because the mine at which the accident occurred had been condemned. After the inspectors had closed the mine a number of miners formed a company and agreed to work at their own risk. An explosion occurred Feb. 18, 1916, presumably from a windy shot.

Some of the fatalities were of rare occurrence. At the Waverly mine a portable electric fan was used to brush gas from a room. The foreman, wishing to change its location, ordered it stopped. In throwing the switch the spark set fire to gas that exploded, killing two men and badly injuring the foreman. In Ray County a man in starting a gasoline pump was asphyxiated by the fumes. In one of the Lafayette County mines a man was killed by ice falling down the shaft. Over 17 per cent. of the fatal accidents tabulated was due to electricity.

The Fact That the Percentage of Sulphur does not necessarily indicate the behavior of a coal in the furnaces is recognized in the specifications recommended by the Bureau of Mines. The contractors, however, are required to specify the sulphur content so that standards for the coals to be delivered may be established.

The Exploratory Borehole

By James Steelman

SYNOPSIS—It is frequently desirable to determine the extent and thickness of a coal deposit, as well as the nature and thickness of the overlying strata before commercial development is attempted. Two general types of machines are employed for this purpose, namely, the rotary and the percussive drill. Of these the rotary machine, employing either steel shot or diamonds as the cutting agent, appears to give the more reliable results.

After the preliminary investigation of a locality has been made, and it has been determined that coal probably exists in commercial quantity, it is good practice to make a further investigation with a view to securing exact and fairly conclusive information as to the thickness, extent and quality of the coal bed, and its depth below the surface. It is also of importance to know in advance the character and disposition of the overburden and the location and extent of fissures and water-bearing strata.

Shafts will give all this information, provided they are sufficiently numerous and properly distributed. But shaft sinking is expensive work, the cost in most cases prohibiting a thorough survey of the subsurface conditions. The borehole is now an approved means of getting precisely the same information. It is in considerable favor because in many cases a much greater total amount of information may be secured with the expenditure of a given sum than could possibly be secured with shafts. Furthermore, as boring is practically independent of conditions, it may be carried out in cases where a shaft would be next to impossible, or extremely expensive.

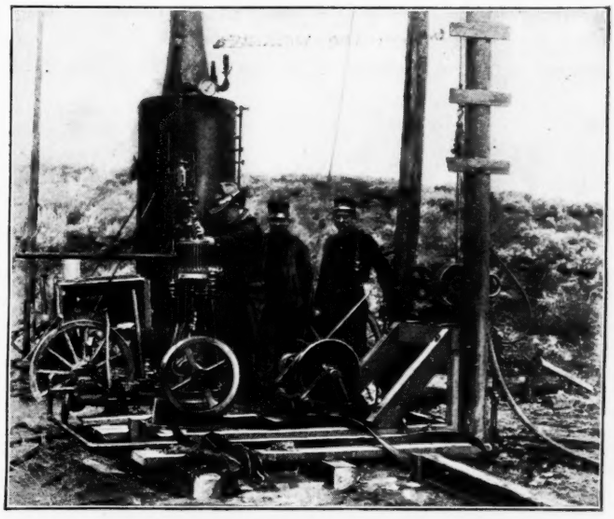
There are several methods by which boreholes may be put down. These methods, however, are often not equally suitable for a given set of conditions. One system of boring will be comparatively advantageous for penetrating soft material, but will be inferior in the character of the sample recovered from the strata penetrated. Another system is suitable only for vertical holes; while a third may be used with almost equal facility for either vertical or inclined holes.

An important fact to keep in mind is that all boring procedures are not equally expensive. Money may often be saved by using the cheaper methods for certain work and the more expensive for that where conditions warrant it.

Boring methods may be classed under two heads—percussive boring and rotary boring. In the former, the drill is lifted and dropped repeatedly, its own weight as well as that of any other parts that may be rigidly secured to it providing the driving impulse. Between blows the chisel, or drill is turned through an arc to present a fresh surface at the bottom of the hole at each successive blow. This general method may often be carried out with great simplicity. It is efficient and economical. The chisel may be weighted with other metal pieces and the whole lifted and dropped by means of a hemp cable running to the surface.

In a well known American system of churn drilling there are four distinct metal parts. These are the bit, the stem, the jars and the rope socket. The bit varies with the service required; the jars are not always used. The rope holding the string of tools passes over a sheave mounted at the head of the derrick. The mast or ladder of the derrick is hinged at the forward end of a truck so that it may be lowered to a horizontal position for shifting, etc.

The cable is actuated by a walking beam. Power is applied to the cable only on the upstroke. The driving apparatus would accordingly be subjected to sudden application and release of the full load if it were not for the use of some device to minimize these shocks. In some cases a flywheel is employed for this purpose, in others a patented spring device is used. During the interval between lifts, the engine is at work compressing the springs. The resistance amounts to 1,200 to 2,000 lb.



A DIAMOND DRILL OPERATED BY STEAM

The recoil assists in the lift. The compression of the springs is effected by the engine prior to the release of the drilling tools. The springs, therefore, do not interfere with the fall.

The hole is started with the spudding bit, a tool whose cutting edge is decidedly wider than the main body. A single flute on one side permits the movement of loosened material. The use of this bit will be continued until the string of tools is below the surface. If the material being penetrated is quite soft—soft enough, say, to permit a penetration of 1 ft. in 15 min.—it may be used for one or two hundred feet or even more. The spudding bit will ordinarily be employed until the pipe has been put in.

The mode of actuating the cable when the spudding-in process is used differs from that employed when drilling through hard material. On the framework constituting the walking beam are rigged two sheaves. The cable passes up over the sheave at the head of the derrick then down and through these two sheaves on its way to the reel. When spudding-in is going on, the upward movement of the walking beam results in lowering the string of tools and the downward movement in raising it.

When regular drilling is going on after spudding-in, the cable is held by a device called the tempering screw. This is suspended from the center of the crosspiece connecting the forward ends of the two parallel arms of the walking beam. The rise and fall of the beam will now correspond with the movement of the tools. The tempering screw provides a means not merely of attaching the cable and tools to the forward end of the walking beam, but of minutely adjusting the length of cable actually under tension.

The operation of a cable drill appears to differ substantially from that of the percussive drill using a long line of rods—although the difference may be one of degree only—because of the elasticity of the rope and the upward momentum of the heavy tools; that is, the stroke of the walking beam is less than the movement of the tools at the bottom of the hole. The upstroke of the walking beam is rapid and results in the movement of the tools continuing after the upward pull of the cable has ceased. Likewise, if the adjustments permit, the elasticity of the rope allows the tools to stretch it. These additions to the tool stroke may, in the case of a deep hole, be greater than the walking-beam stroke by an amount equal, it is thought, to 10 or 12 ft. When the cable is quiescent the bit should be some distance above the bottom of the hole.

Thus, if the rope under tension is 50 ft. long, the bit should fall short of the bottom of the hole by 2 or 3 in. Approved practice requires that when the apparatus is in operation the tools should stretch the rope just enough to permit a proper blow. Further, if there is an excess of cable, the jars will open and shut at every stroke, which is undesirable. The operator will be able, after some experience, to determine from the "feel" of the rope when at its utmost tension if the blow is the proper one with the jars undisturbed.

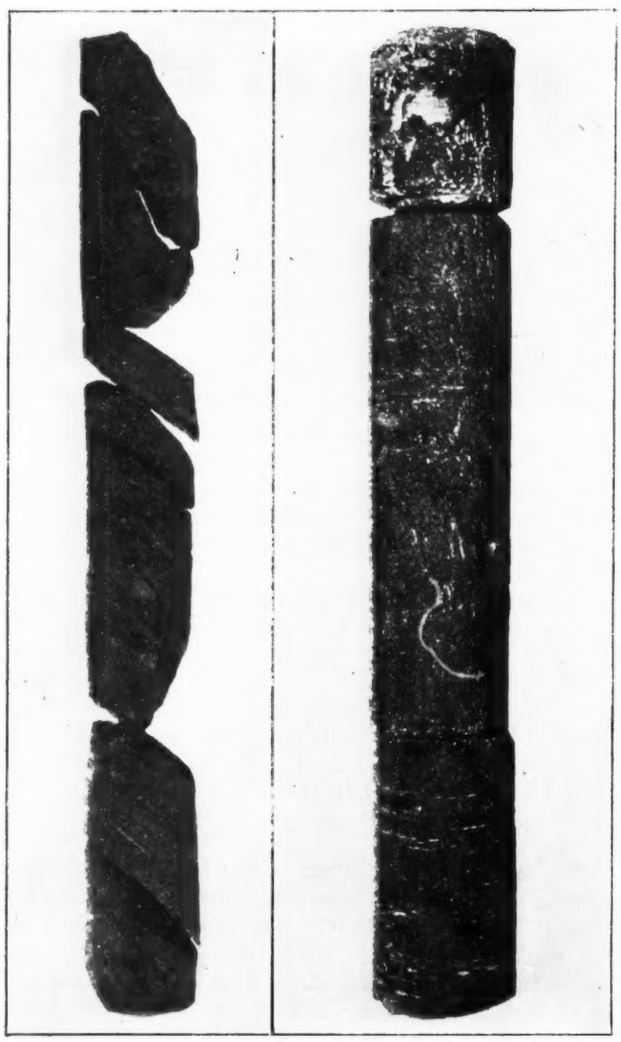
The tempering screw affords a means of adjustment. The stretch of the rope will vary with its length, the weight of the tools, the size and age of the rope, etc. "Drilling on the spring of the cable," as the procedure which allows for the stretch is termed, is claimed to possess certain advantages.

The jars are a metal device introduced in the string of tools between the stem and the rope socket. Their purpose is to prevent the bit from sticking. They perform no other service except the addition of weight. While the bit works freely it is considered advantageous that the jars should be prevented from opening and closing. This is done by maintaining a taut rope—that is, by "drilling on the spring of the cable."

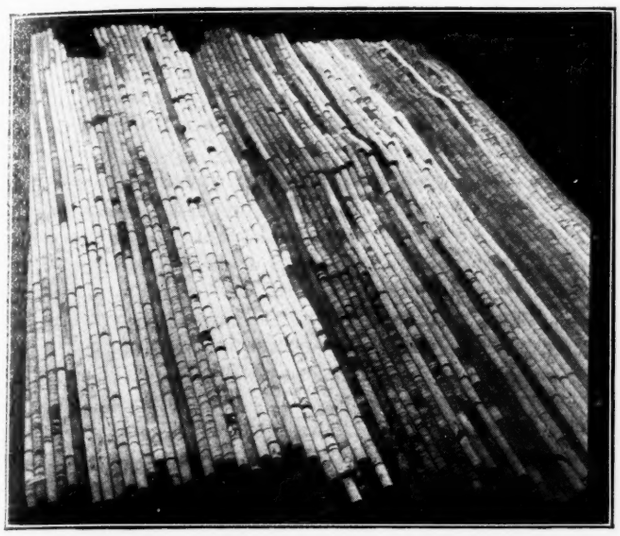
An important matter in connection with percussive drilling is the turning of the chisel between blows. At the beginning—that is, up to the time when the string of tools disappears beneath the surface—the operator may turn them through a moderate arc by hand. With the cable drill operated on the spring of the cable the turning may be provided for automatically. The torsion of the rope, whether under tension or not, will rotate the tools backward and forward. This action is sufficient if the drill is working freely in the hole. "To make certain of this point, revolve the drill about five times continually in one direction, striking about six, eight or a dozen blows per round. If at the end of the fifth turn the machine runs freely and the cable does not seem to twist or untwist, it will prove that the drill is turning all right. The driller then reverses the twist for say ten turns in the opposite direction, and ten back again, and so on."

There can be no question that churn drilling wherever practicable and when sufficiently satisfactory in results is much cheaper than core drilling. The cost of equipment is moderate. So also is the expense of operation. The principal item of upkeep is probably the renewal of the cable. The samples recovered from churn-drill operation are naturally broken into fine particles. These may or may not be satisfactory. Apparently they give no information as to the inclination of strata traversed. As to the continuity of a given stratum, the samples would seem to afford but little information. One at least of the manufacturers is prepared to supply a special device by the use of which a fairly perfect specimen of bituminous coal may be recovered from a deep-lying bed, if the claims for this apparatus are well founded.

The device consists essentially of a hollow core barrel which is adapted to slide, together with a suitable superimposed weight, up and down within a special cutting bit. These elements replace the ordinary drilling bit when the vicinity of the upper surface of the coal measure has been reached. It is understood that a good core may be obtained throughout the full thickness of the bed.



A CORE FROM STRATIFIED ROCK AND ONE FROM A COAL BED



CORES FROM A BOREHOLE, SHOWING METHOD OF PRESERVATION

The diamond drill is perhaps the oldest type of apparatus adapted to secure a core of all the strata penetrated. It belongs to the rotary class. The bit is given a double motion. It is rotated and fed forward simultaneously. The rotating movement is accomplished through a line of hollow rods extending from the surface down. The forward feed may be attained by hydraulic pressure forcing the line of rods downward or by a screw-thread device.

The cutting is accomplished by means of diamonds arranged on the annular under surface of the bit. The diamonds may be arranged in staggered order, one set of alternate stones making the inside of the cut and the other set the outside. The cut made has the form of a cylindrical shell. Accordingly, a core of the material penetrated is left inside the drill barrel. By the use of special devices, this core may be recovered in short or long lengths.

The cores may, and ordinarily should, be arranged for preservation so as to disclose the geological record of the strata in proper sequence. Furthermore, the core will disclose the inclination of the stratification to the axis of the core barrel. This does not necessarily mean the inclination to the vertical.

In coal, a core having a diameter of 2 in. is perhaps sufficiently substantial to prevent breakage.

There can scarcely be any doubt of the efficiency of the diamond drill as a prospecting tool. It is capable of penetrating the hardest rock. The diamonds stand up well as long as there is no shock. The abrasive action may be safely carried on even under considerable pressure, provided the diamonds suffer no blows. However, the cost of the diamonds is a large item. The black diamond, somewhat harder perhaps than the colorless stone, is obtainable in good sized specimens but not at a moderate price. Some years ago the price was as low as $10 or $20 per karat; but that is not at all the case today. The price has gone up to much higher figures.

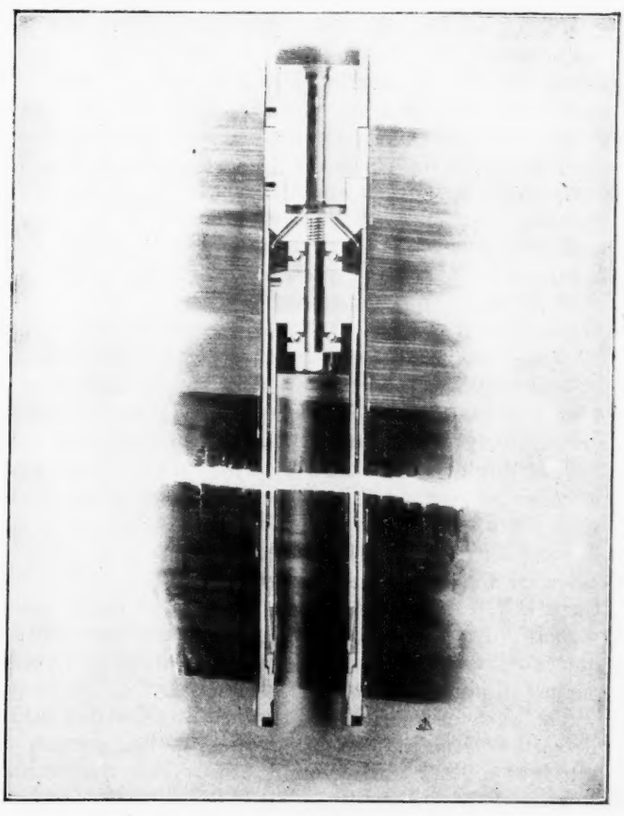
The sizes of the diamonds used range from 1 to 4 karats each. In one bit there may be six or eight stones. If the work is handled in two or three shifts, it may be necessary to employ one man to attend especially to setting and resetting. But, despite the cost, the diamond drill is today an important instrument in prospecting. There must accordingly be an adequate offset to the expense in the certainty, reliability and general satisfactory character of the procedure.

One of the rather distinctive characteristics of the diamond drill is its adaptability for boring oblique, or inclined, holes. A notable instance of successful boring of this kind occurred in connection with the construction of the inverted siphon that will accommodate the waters of the Catskill Aqueduct in their passage beneath the Hudson River at Storm King Mountain, a short distance north of West Point.

It was here highly desirable to ascertain in advance the character of the rock for a considerable depth below the river bed. In addition to certain vertical holes, four oblique ones were put down by the diamond drill. These holes were run from stations below the surface in the two vertical shafts, one on either side of the river. Two holes, one from either side, were put down at an angle of perhaps 60 deg. The holes of both pairs were continued until they in effect met or crossed. The upper pair averaged 1,650 ft. each, in length; the lower, 1,942 ft.

The horizontal portion of the siphon was driven in the rock lying between the two locations tested by the meeting points of the pairs of boreholes. These four holes are perhaps among the most notable of all oblique borings yet successfully attempted.

Another type of core drill is called the shot drill. Diamonds are not used. Instead, a quantity of small steel fragments is employed between a rotating head, or bit, and the bottom of the hole. There results a grinding action of the hard pieces of steel similar to the action of the diamonds. Naturally the abrasion of the steel shot is far in excess of that on diamonds. On the other hand the shot are comparatively inexpensive.



THE CORE BARREL OF A DIAMOND DRILL

In both shot and diamond drilling water must be used to clear away the results of the grinding action and also to keep the metal parts cool. Churn drilling also requires water. The necessity of providing water may at times prove difficult to meet. Of course, if steam is used for power, there exists an additional demand for water.

Power with the rotary systems is employed to revolve the bit, crown, or head, and also to lift and lower the rods. Steam, electricity and gasoline are all proper sources of this power.

In the driving of boreholes, particularly when rotary systems are employed, some deviation from a straight line may be expected. It is not easy to tell the course of a hole by mere casual observation. In fact more or less exact methods of survey have been developed. I have not space in the present article to go much into detail. Suffice it to say that the inclination to the vertical at any depth may at times be determined by the use of a glass tube containing a quantity of hydrofluoric acid. The tube is let down to the desired level in such a way that it will be parallel to the axis of the borehole. It is kept quiet for a period, during which the acid will eat away the glass. The deviation from the horizontal of the etched mark (corresponding to the surface of the acid) will be approximately the deviation of the axis of the hole from the vertical.

Similarly, a tube of liquid gelatine may be lowered to any desired position and there allowed to solidify, the deviation of the solidified surface from the horizontal giving approximately the information desired. This method is inapplicable for deep holes or where conditions other than depth are sufficient to cause premature solidification. Even when the deviation of the borehole from the vertical has been ascertained this does not afford all the desirable information. It is advantageous also to know the direction of the deviation. E. F. MacGeorge has designed a special form of instrument to determine this additional point. The extent of possible borehole deviation will be realized perhaps by considering the case of a South African boring which in 4,802 ft. of hole deviated 2,185 ft.

Economics of the Safety Movement

SYNOPSIS—Money spent for safety is an investment the productivity of which depends upon the care exercised in the expenditure. Accident prevention, first-aid and welfare work promote efficiency and tend toward the true conservation of labor.

Since the advent of the safety movement and the application of the principles of accident prevention to coal mining, attention has been concentrated—and justly so—on the humanitarian side of the work. While it is true and susceptible of proof, that every dollar spent for safety—genuine safety—in an earnest desire to lessen accidents is an investment, yet like any investment this is profitable only when spent in a careful, well-planned manner. Conversely, failure to properly safeguard the worker is a detriment to business, just as surely as is failure to maintain any other part of the equipment of a plant in proper working order.

Labor is a necessary part of the equipment of any operation, and in the same manner as with raw material, its cost is controlled by the laws of supply and demand. This fact is forcibly established by the conditions now prevailing in the labor market. The demand for labor has not diminished through the application of machinery to mining. Rather this demand has strengthened and gives promise of increasing still further. To satisfy this demand there must be provided an additional supply of labor, or the existing supply must be so conserved that there will be an increased per capita production—either or both. In other words, we must attract more labor to our industry and must eliminate the waste of labor as we are eliminating that of raw material.

The waste of raw material is something that can readily be seen and noted. The gob piles on the surface, the unmined pillars underground are wastes that can be located without difficulty. But the waste of labor in its various forms is something intangible, requiring, except in the case of the loafer, much study to locate and much more study to determine and apply a cure.

In the elimination of this waste of labor we have the service of two distinct professions—distinct at present, yet so closely allied that they should be associated in every consideration. They are that of the efficiency engineer and the safety engineer. These are closely allied, because to be efficient anything must be safe. A haulageway with crooked rails, loose fishplates and poor bonding is not safe—neither is it efficient. A machine with gears unguarded, around which the employee must move with utmost caution, is unsafe—and by the same token and to the same extent it is inefficient.

Lack of protection for an employee anywhere is a cause for lack of efficiency on his part, because when he must divide his attention his work will suffer—and his employer pays. For genuine efficiency seek first genuine safety, which protects every man and so places him in and at his work that the possibility of an accident is eliminated in so far as such an accident can be foreseen. Safety and efficiency will thus be found so closely associated that separation is impossible. Safety precautions, thoughtfully executed, add to the productive powers of the worker and react to the credit of the investment.

Let us consider now, other values of the safety movement. I have dealt briefly with only that part of the supply of labor which is now available. There are other sources from which a supply may be drawn. There are those men who have left the mines—waste labor to be reclaimed—and those who by all rights should be mining, but have sought their vocations in other industries. The same impulse actuates them all, either consciously or unconsciously—the hazard is too great. The result is a lessening of the available supply of labor.

Here is another credit for the investment in the safety movement. We can systematize, safeguard the worker, demand the elimination of careless practices, warn, instruct, point out the effect of one man's carelessness upon another, and when, despite all efforts, an accident occurs,

we may have ready and prepared first-aid and trained service so that the agony of grinding bones and the torture of lacerated flesh are in large measure soothed and allayed, and maiming or death need not necessarily follow. It is thus possible to remove the stigma of excessive danger from mining and lessen the hazards of the mines until the time will come when it may be truthfully said that mining is as safe as any other occupation.

This may sound far fetched, but is it? Time was when powder mills maintained a special fund for rebuilding and damage suits. Today statistics show the manufacture of powder to be less dangerous than railroading or mining. Thus in time the coal industry may hope to regain the imaginative man—doubly valuable through the possession of this imagination—who has pictured himself maimed, as he has seen others. It may also gain new men, careful and cautious—equally valuable—who did not care to risk the hazards existing in the past.

However, should we go to the limit in safeguarding men, we cannot hope to achieve the full benefit of the movement unless we are prepared to take up that branch of the work which pertains to the welfare of the workers and touches a spot intimately connected with every man's productive ability—his home. This home is in the majority of cases so situated, and the manner of growth of its environs such, that it hardly attracts the imaginative man. And it is such a man, capable of thought as to his manner of living, who is most anxious for much work—a good producer—the man most useful in any industry.

Such men are often lost to the mines. Employees' service—welfare work—will make an attractive camp, insure healthful surroundings, provide wholesome amusements and produce contented, intelligent workers with an advanced idea of living and a resultant increased knowledge of the value of their earnings. This accomplished, an incentive has been furnished for increased effort.

Higher prices for labor will not increase a man's value in production. True, higher prices attract men to an industry, but they do not stimulate to greater production. To the average worker a high price for his labor breeds but one thought—a shorter working day. And this means less production. His needs are simple, easily met, and, having worked a sufficient number of hours to earn the wherewithal to satisfy these needs, any further time spent at work seems to him needless. If the hours he is required to spend at his task are more than those his standard of work require, he will lay off; not, mind you, with conscious intent, but because, subconsciously, his mind has reached this conclusion and he lacks an incentive to drive him to further effort. Thus it is with the average man. There are exceptions; but these exceptions will not always remain productive laborers, but will eventually direct production, or else they are men who have already an adequate incentive to drive them to work.

Thus the investment in the safety movement besides granting to all workmen an equal chance to the full enjoyment of the blessings of health, strength and proper living, will increase efficiency by permitting full concentration on the work in hand, hold to the industry men already trained therein, attract others to the field and increase the worker's capacity for production. All of these things, to the operator capable of seeing the value that lies in the conservation of labor, will prove the worth of his investment and, when thoroughly understood, will enable him to wisely conduct his share of this great work.

Recollections of a Manager

Mr. Stribling, one of the directors of our company, was also a director in a steel-making corporation that inaugurated a system of dividing a portion of its profits with its higher officials. The results obtained by the steel company were so startling that Mr. Stribling thought that our company should give the system a trial, and he lost no opportunity to boost the suggestion with our officials and directors. Finally, our directors decided that the scheme merited an investigation, and I was instructed to visit the plant of the steel company, Mr. Stribling arranging matters in advance so that I should be given access to all records and data.

I spent ten days, in all, making the investigation. First, I spent a day in the office looking over records; I found that Mr. Stribling had passed on to us in his numerous talks most of the interesting information that the records contained, so that part of the investigation required only a few hours.

An investigation of the company's laborers was all that remained now, and in that I quickly came to a realization that nothing had been said to us by Mr. Stribling, nor anyone else for that matter, about the effect of the bonus system upon the men who were not allowed to share in the profits; the laborers whose efforts surely made the profits possible. During the next eight days I steered clear of all bosses and officials, and endeavored to find out what actually happened to the "laborer and his wife" while the earnings of the bosses increased by leaps and bounds.

I was not able to arrive at any definite conclusion, however, during those days, and I started back home at the expiration of the time allowed for the investigation regretting that my report must be unsatisfactory. Then a dream came to my rescue while I was enroute home. It gave me a definite conclusion that remained with me as a definite conclusion not only during the following day, but through all the years that have elapsed since then.

In the dream, I returned to inspect the men connected with the steel plant and beheld them suddenly separated into three distinct groups—the profit-sharing owners, the profit-sharing bosses, and the nonprofit-sharing laborers.

Then the scene was shifted, and I found myself at a horse race.

I seemed to be seated in a grandstand listening to a conversation between the owner of one of the horses and the man who was to drive the horse. They were quarreling about terms of compensation; finally, the driver got the better of the argument, and the owner agreed to share all prizes. Having carried his point, the driver started for the stables, bubbling over with enthusiasm. The owner turned to me, and I saw that he was anything but enthusiastic. "They say I am heartless," he began, "because I allow my drivers to drive my horses to the limit of their endurance.

"Well, perhaps I am, but the man who is doing most of that talking about me is himself an owner in the steel plant that you just left, and he and his drivers can give me lessons in the 'spurring on' game; my, but how those horses that they are riding (human beings at that) respond to each crack of the whip.

"Of course, it furnishes excitement for the drivers and the owners, but where is it finally going to lead the men that are being driven?"

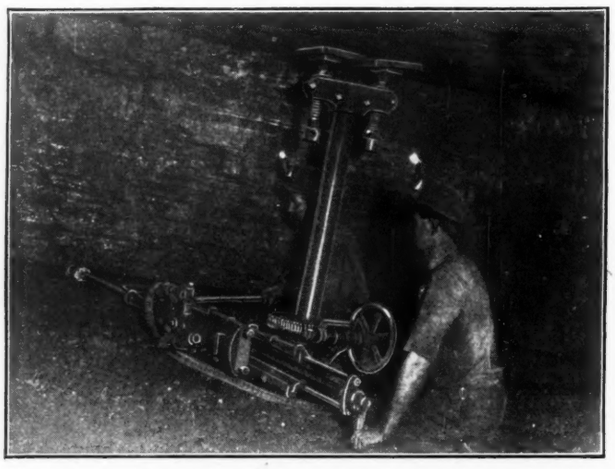
"You've hit the nail on the head," I said, excitedly, and then I awoke.

Mining Thin Coal Beds with Air Punchers

By S. W. Symons*

The June 17 issue of *Coal Age* contains an inquiry on how best to mine thin coal beds. It might be of interest, therefore, to know how this is done in some of the bituminous mines, where thin beds are worked and where compressed air is employed. A knowledge of some of the methods that have recently come into use for mining anthracite may also prove of interest.

A device frequently employed for thin beds in bituminous mines is the "radial" type of mounted pick machine, with which the readers of *Coal Age* are probably familiar. Beds as thin as 2 ft. have been mined successfully in Europe with this type of machine. The general method of mining is to undercut to a depth of 5 or 6 ft., and sometimes, as in the case of bad roof, to overcut the coal, after which it can be broken down in the usual manner, using about 1 hole in every 9 or 10 ft. of face and two to three



RADIAL PUNCHER AT WORK

sticks of explosive in each hole. The number of holes or the amount of powder can be reduced when the coal is overcut, but this is only warranted when the roof is in bad shape, or when by so doing it becomes possible to eliminate timbering.

The radial puncher is made in two styles, one operated by compressed air and the other by electricity. The compressed-air type can be operated from a small portable plant mounted on a mine car. Some of these portable outfits are becoming popular in the anthracite district. The compressed-air machine is lighter and more easily handled than the electric type, though it consumes slightly more power.

It is impossible to make any definite statement as to the coal-cutting capacity of the radial type of puncher, 200 to 300 sq.ft. of cutting per 8-hr. day being considered a fair average for fairly hard coal. But in lignite, in a Canadian mine, with one of the latest types of radial machines, as high as 180 sq.ft. per hr. of actual cutting time has been recorded.

The beds of anthracite coal mentioned above carry a shale parting, which is cut out by the radial puncher. To do this two cuts are required, a bottom and a top cut, after which the intervening portion can readily be broken out. Or, if the material separates freely, a single cut at the bottom will suffice and a hand or pneumatic pick may be employed to bring down the coal. There appears to be no adequate records available of the speed to be expected in shale, but it is doubtful if there is a machine other than the air puncher which could handle it to equal advantage.

This method of mining, besides eliminating the shale and leaving the coal intact, has the effect of reducing the number of shot holes and the amount of powder necessary.

In mining anthracite, and also, to a limited extent, in bituminous operations, the air-driven Jackhamer drill is often employed for boring shot holes. This has been brought about by the ever-increasing demand for greater production. One particular instance which closely parallels the case outlined in *Coal Age* of June 17, is that of the St. Louis, Rocky Mountain and Pacific Co., of Koehler, N. M. In this mine the seam was 40 in. thick with an 8-in. parting 7 in. from the bottom. The parting (material unknown) was cut out with an air puncher, after which, in a 40-ft. room, it was necessary to place four shots in the top and bottom benches to loosen them properly for loading. The coal was hard and contained sulphur bands near the roof, which made drilling difficult.

A Jackhamer drill was installed and resulted in a doubling of the output, increasing the men's wages about 50 per cent. and making an actual saving of 9c. per ton in addition to that resulting from increased production. Under test, six 4-ft. holes, 14 in. of each hole being through hard sulphur, were drilled in 20 min.

*New York, N. Y.

COMING MEETINGS

The American Mining Congress will hold its 19th annual session during the week beginning Nov. 13, 1916, at the Hotel La Salle, Chicago, Ill. Secretary, James F. Callbreath, Munsey Building, Washington, D. C.

A Miners' Field Day and First-Aid Contest will be held Oct. 21, 1916, at Jellico, Tenn., under the direction of the Tennessee Mine Foremen's Association, Southern Appalachian Coal Operators' Association, Tennessee Mine Inspectors and the Bureau of Mines. Twenty teams are expected to take part in the contest. Philip Francis, of Jellico, Tenn., is chairman of the General Committee.

The National Safety Council will hold its annual meeting and Congress at the Hotel Statler in Detroit, Mich., Oct. 17-20. The program is a long one, containing the names of 140 speakers. Wednesday and Thursday morning, Oct. 18 and 19, will be devoted to the mining section. Secretary, W. H. Cameron, Chicago, Ill.

The American Institute of Electrical Engineers will hold its 326th meeting in the Engineering Societies Bldg., New York City, Friday, Nov. 10, 1916, at 8:15 p.m. The general subject of the meeting will be Inventories and Appraisals. Secretary, F. L. Hutchinson, 33 West 39th St., New York City.

The Coal Mining Institute of America will hold its annual meeting on Wednesday, Thursday and Friday, Dec. 6, 7 and 8, 1916, at the Fort Pitt Hotel, Pittsburgh, Penn. The annual dinner of the Institute will be held on the evening of Dec. 6.

The Bureau of Mines Has Charge of the Sampling of Cargo Shipments of coal to the Isthmus of Panama for the Panama Railroad Co. The coal, which is loaded from piers at Hampton Roads, Norfolk, and Newport News, Va., is dumped directly from railroad cars into ships carrying from 4,000 to 12,000 tons. The method followed is to collect portions of coal from every railroad car dumped. From 30 to 60 lb. are taken from each car sampled, the quantity taken depending on the size of the cargo. From 3,000 to 4,000 lb. are usually collected as a gross sample to represent a cargo. The gross samples are reduced in successive stages as collected, rather than accumulated and later reduced to quantities convenient for transmittal to the laboratory.

Electricity in Coal Mining*

By C. B. Davis

SYNOPSIS—Indirect benefits derived from conditions more carefully watched have been credited to the employment of electricity. Electric haulage is more destructive to rolling stock than some other forms and tends toward congestion at the tipple. For rock drilling, the small electrically driven compressor has many advantages over the permanent plant.

My first experience with electricity in mines was with the Tennessee Coal, Iron and Railroad Co. about 13 years ago, when Robert Hamilton sent me to No. 3 Pratt mine to find out why certain electric locomotives, which had just been installed, were not producing the desired results. The trouble was "bad railroading"—that is, poor dispatching, bad meeting points, etc.

If I am rightly informed, this was the first permanent installation of the kind in Alabama. After this, electrical installations spread over the Warrior coal field first and later to the others, especially as the larger companies developed high tension plants and the Alabama Power Co. spread its lines over the country so that energy could be obtained without the necessity of installing a generating plant.

Many Uses for Current

At the present time electricity is used in the mines for the following purposes: To cut, haul and hoist the coal; light terminals and sidings; pump water; compress air; drill rock, and operate telephones, etc.

In cutting, a machine was used at first to undercut the coal, this work taking the place of the old hand mining, which was both slow and laborious and did not produce as satisfactory results as machine cutting.

The first of these under cutters were known as breast machines. They had no side travel and simply sumped in and out.

The next development was the short wall machine, which was able to sump on one side of the room and then mechanically cut across the face with only the one sumping cut. This machine also had a self-propelling truck. The cutter bar was rigid and extended straight ahead of the machine. This type of cutter is the one most used in the Alabama district. It is distinctly an under-cutting machine, one that has to be unloaded from the truck to do its work, and will undoubtedly meet more varied conditions than any other type of mining machine. It is especially adapted to the low-vein coals numerous in Alabama.

The next development was a longwall cutter. This is similar in general design to the shortwall machine, except that the cutter bar swings about a pivot and the machine works, after the sumping cut has been made, at right angles to the cutter bar. The longwall machine, as the name implies, is especially designed for mines laid out for the longwall method of mining and is intended to operate continuously backward and forward over a face 400 ft. or more in length. It consequently has no power-driven truck. There are few mines in Alabama working on this basis and few longwall machines are in use.

Another later development in mining machines is an arcwall machine. This is designed to work in coal above 4 ft. in height. The principal difference between it and other machines is that it does not have to be loaded or unloaded from the truck or moved across the face of the coal. A cutter bar 11 ft. in length is mounted on a vertical shaft, which allows this cutter bar to swing through an arc, thus cutting a room 22 ft. in width. This machine is ordinarily arranged for top rather than bottom cutting, although a special attachment may be obtained to allow of cutting the top, center or bottom.

Another maker builds a machine of the same general design as the arcwall machine except that the cutter bar has a sumping motion so that the face of a room cut by this machine is a plane—that is, the face is practically at right angles to the sides. These machines, however, require a reasonably high coal and uniform conditions where it is possible to place the track close to the center of the room and where the rooms must not be over 22 ft. in width. If 40-ft. rooms were to be cut, each of the two necessary tracks would have to be 10 ft. from the rib. In other words, these machines are not adapted to general conditions in this district.

A New Mining Machine

I understand that there has been developed a machine which operates along the following lines: It has a cutter bar similar to that used on the ordinary breast machine. On each side of the cutter bar is located a shearing machine. These are capable of cutting the coal in a vertical plane. Thus a means of cutting the coal on the bottom and sides has been provided. After this is done the coal is broken down by means of a set of bits mounted on a steel frame located on top of the machine, but so arranged as to strike a blow at any height directly in front of the machine. The pan of the combined conveyor and elevator, which passes over the machine to the cars, is located on top of the lower cutter bar so that as the coal is broken down and falls it is carried back over the machine into the cars. This type of machine has the advantage of loading coal without shooting, and with the exception of a change of crew should operate continuously. I understand that it has been tested out and for clear coal has proved very satisfactory.

As a rule, mining machines may be operated by direct current and where the law allows by alternating current. The next machine discussed, the locomotive, can only be operated by direct current.

In the old days when mules were used to gather the coal at the working faces, the output was averaged at from 50 to 60 cars to the mule. Frequently this would drop as low as 30 or 35 and in some cases go over 100. This was owing to the fact that certain mules had more favorable hauls than others. When the electric locomotive was introduced for gathering purposes the advantageous haul was stopped, because the motor was a new and much more expensive "animal." I firmly believe that a great many of the benefits derived from electric haulage

*Paper read at the annual outing of the Alabama Coal Operators' Association.

were indirect and arose from frequent investigations as to why the motors were idle.

A rapid advance has been made in the design of locomotives in the last few years, practically all the makers using ball-bearing motors, steel, or a combination of steel and cast steel frames, and in some cases, automatic couplers. Practically all machines, except the smallest, have outside frames, thus protecting the wheels and bearings and allowing for the better arrangement of the motors. Sufficient power is provided to allow for the use of all the tractive effort to be had. The result is a most efficient machine.

All locomotives at the present time are operated upon direct current. There are many reasons why alternating current cannot be used, but one alone might be mentioned which would be decisive in itself, and that is the complication of the wiring system.

When the electrical locomotive was first placed in the mines it was used largely for gathering purposes, in a general way taking the place of the mules and gathering cars from the rooms to the partings, where it was taken by tail rope, hoist, or endless rope to other partings or to the tipple. As the locomotive was developed and became a more finished machine, the size was increased, and for several years the larger machines were used in connection with the small gathering locomotives to handle large trips to the main hoist or frequently to the tipple itself. In other words the larger locomotives, where the grades allowed, made the long haul, runs of two or three or even four miles in length. It is found that a haulage of this kind brings to the tipple cars in large numbers at more or less infrequent periods and thus tends to congest matters; also that it is more expensive to operate and decidedly more destructive to the rolling stock than an endless rope, which operates most favorably under exactly the same grade conditions as the electric haulage. Thus we are gradually coming back to the original idea of using rope haulage on the long hauls and locomotives only for the comparatively short hauls at the working faces.

Is an Electric Main Hoist Advisable?

Going now to the application of electricity to the hoist, it would seem that, generally speaking, there is no question as to the advisability of using motor-driven hoists inside of the mine, or at isolated points where the question of installing the necessary boilers and of bringing the coal to these plants must be considered. These installations all hinge on one important feature, one of the main factors in the other electrical installations, the efficient transmission of power over greater or less distances.

There are a number of hoists manufactured to meet the various conditions arising, so it is comparatively easy to select a machine to do this class of work. However, when it comes to the main hoist to be located at the tipple and near the main power plant, it is a question as to whether it is advisable to put in an electric hoist, except under limited conditions. Generally speaking, where hoists are working on vertical shafts or heavy inclines, peak loads are high, while the average power demand is comparatively low. Consequently it is doubtful if it is advisable to install a plant of sufficient size to meet the peak load or to purchase power to run a large electric hoist, because of the part that the heavy peak load plays in the purchase price of power. But should the main hoist at the tipple be an endless rope, where the load is uniform, it is probable that there are many cases where an analysis of the conditions would show it an advantage to use an electric drive, especially where the power is purchased.

It almost goes without saying that it is advisable to use electric lights in mines wherever possible. I believe the majority of sidings, terminals, pumprooms, etc., are too poorly lighted; that money could be well expended in properly whitewashing the walls of these terminals and placing there plenty of electric lights; that the results obtained in the way of more efficient work and the reduction of the number of accidents would justify the added expense.

Considering the handling of water in the mines, there are roughly two classes of work to be done in dewatering a mine. One is the handling of the water at the main or permanent pumping station, the other is its removal from the entries, slopes and shafts, where work is continually advancing and the length of suction and discharge constantly changing, as well as the actual vertical lift and head against which the pump must work.

The Ideal Pumping Unit

At the main pumping station the ideal plant should consist of a motor-driven plunger pump of high efficiency and of sufficient capacity to easily handle the water for nine months in the year, with a reserve centrifugal pump of from three to four times the capacity of the plunger pump to handle the water during the rainy season. The difference in the maintained efficiencies of these two units would not be less than 15 per cent., and in the case of small installations might be greater. The certainty of operation of the plunger pump is much greater than that of the centrifugal pump, while the first cost is from three to four times that of the centrifugal. The saving in the cost of power, however, would justify the investment.

On the other hand, on account of the comparatively short period of operation of the centrifugal pump, the smaller investment would be a redeeming feature. Further, on account of this short period of operation, there would be plenty of time for overhauling the machine.

The upkeep on the plunger pump should be less in proportion to first cost than that of the centrifugal pump during a period of operation of, say ten years.

For the sinking pumps the only installation is a plunger pump. This should be motor driven through single-reduction gearing where there is sufficient space, and either mounted in a sling for a vertical shaft or on a truck for slopes or headings. The performance of a centrifugal pump is such that it will not work favorably under a varying head and suction. Furthermore, the unusual amount of sediment contained in the water will affect the efficiency of the pump.

Two distinct types of machines are employed for ventilating the mine: First, the small fans located at various places in the air courses of the mine to boost or increase the velocity of air at needed points and second, the main ventilation plant, usually located on the outside and generally near the main power plant or on the surface at the top of the main ventilating shaft. The booster fans are usually of the disk type and generally direct connected to the motor, which is of high speed. They can easily be transferred from one point to another.

The outside or main ventilating fan is of the multivane type and should be belt driven from a motor. There should, however, be another source of power for this fan as the certainty of its operation must be absolutely guaranteed.

For drilling the rock in heading and tunnel work the most satisfactory equipment is a small electrically driven, portable air compressor mounted on a truck having a capacity of about 100 cu.ft. of free air per minute delivered at about 90 lb. pressure. This machine to operate in turn either a light rock drill or Jackhamers, as the case requires. This equipment can be moved from place to place by a small gathering motor and thus work a number of headings.

The telephone has become a necessary adjunct in connection with the operation of a mine. Its principal functions are the dispatching of trains, giving orders and in case of accidents the prompt and efficient rendering of assistance to the injured. The modern mine could hardly be operated without this device.

In conclusion I do not consider it within the province of this paper to enter into a detailed discussion of the reasons for using electricity in the coal industry. They are, however, briefly as follows: The efficient transmission of power, an easy application of the motive power to the various machines used, and a wide range of carefully developed equipment from which to choose the apparatus best fitted to any particular need.

In Lighter Vein

A Useful Mine Mule

Harlan A. Russel's story of the "Deep Mine Shaft" printed on page 427 of *Coal Age* for Sept. 9, reminds me of a mine I once heard of. This operation was in a 2-in. coal bed. Sawdust was used instead of posts while small sheets of tin served as cap pieces. One day an old baldheaded miner was walking down one of the gangways and ran into what appeared to be a blocked tin cap piece. Careful investigation, however, proved it to be the point of a plow—a farmer was plowing above the mine. A seasoned old mule was extremely useful at this mine and was a great favorite and pet of the men. The animal was so necessary to the successful operation of the plant, that whenever he got sick the mine had to close down. You see this mule was used as a fireboss. They would put an open light on the brow band of the bridle and send him into the mine. If he came back to the shaft bottom without getting singed, the miners knew that it was safe to go to work. This mule was also used as a means of determining the daily output in place of a pair of scales or an automatic weight-recording device or weighing machine. For this purpose the coal would be put in bags and these placed upon his back. When his tail stood straight out it indicated a ton. J. A. G.

Preventing Fuel Losses Due to Exposure

"Young gentlemen," said the lecturer in chemistry, "coal exposed to the elements loses 10 per cent. of its weight and power. This is due to the action of the alkali constituents of——."

"But what if there is a dog sleeping near the coal, professor?"

"None of your levity, young man. This is a serious matter."

"That's what dad thought when 72 per cent. of his coal supply disappeared during three nights of exposure. Then he asked my advice as a student in chemistry, and I told him to buy a dog. He bought a dog with large-sized teeth, and now we don't lose 1 per cent. of our coal a month. That's practical chemistry."

Byproducts Recovered from Modern Coking Plants in England, Wales and Scotland represent an annual value of approximately $10,000,000.

The Rolling Stone

By Rufus T. Strohm

Written Expressly for Coal Age

He Breaks From the Grip of Conventional Chains

THE soul of a vagabond dwells in his breast
And urges him on and away,
His being is torn with a mighty unrest
That nothing can hinder or stay;
And so, when the wanderlust sings in his veins,
He yields to the charm of its call
And breaks from the grip of conventional chains
That hold other mortals in thrall.

He brags that in all of the jobs he has known
None held him for more than a year,
And flatly and bluntly declines to be shown
That his record is puzzling or queer;
Because he insists that the training he's gained
Is wondrously varied and deep,
Though others may value what he has obtained
As patchwork both paltry and cheap.

To all of the regions where men dig for coal
His field of acquaintance extends,
Although it is certain that out of the whole
He counts very few as his friends;
However, he candidly says that he cares
Not a fig how unfriendly they be;
The thing of importance to him, he declares,
Is the fact he's untrammeled and free.

He boasts that no tyrant can hold him in check,
He's too independent to yield;
If one should attempt to bestraddle his neck
He'd move to a different field;
But while independence is good in its way
To free from a workingman's ills,
It isn't the currency needed to pay
The grocer's or clothier's bills.

He Counts Very Few as His Friends.

The Labor Situation

General Labor Review

In the anthracite region, a few mines are having strikes for the 100 per cent. union, and the experience of the southern and central parts of the southern field—that such strikes have not paid—does not appear to have been repeated in the other fields. The making of converts has proved lately by no means so costly as in the earlier strike, though the quality of those who thus easily renounce their past affiliations is perhaps more questionable.

Even the northern end of the southern field, the home of the Lehigh Coal and Navigation Co., shows the nonunion men quite willing to join the organization when a strike is even threatened, and this is explained by some as being due to a secret understanding between the company and the men, a understanding, however, which the company denies.

The question whether "supplies," the price of which to the miner must not be changed, includes coal supplied to him for home consumption, has caused trouble to the Lehigh Coal and Navigation Co. and the Conciliation Board. The umpire must now make answer to the question.

Three hundred members of the union employed at the Greenwood colliery of the Delaware & Hudson Co. at Taylor have been on strike for several days. The men declare that the company promised them a new wage scale, but that it has not so far complied with its promise. David Fowler, the board member, is the leader in the strike, which appears likely to last for some time.

A Settlement in Southwestern Pennsylvania

In the Mercer and Butler bituminous fields of the northwestern Pennsylvania coal field, mining mostly the hard and thin Lower Kittanning and other seams, geologically lower, a scale has been made and signed. About 4,250 men are affected of whom 2,500 are union men.

Some 30 local unions in District No. 5 have prepared a slate for all district officers from president down. Their choice for the chief executive office is not the present incumbent, Philip Murray, but J. E. Jeffers, of Coal Bluff. George Fenton, of Meadowlands, is named as vice-president and the secretary-treasurer they favor is T. E. Phillips, of Hazard.

In Somerset County of Pennsylvania there is no apparent drift to or from unionism. In Indiana and Jefferson Counties the "Buffalo and Rochester" interests have had a widespread strike, but it does not bear evidence of continuance.

In the eastern district of Ohio the mine workers are reported to have demanded an increase of wages from the Rush Run Coal Co. There must be some reason, however small, in the miners' demands, for they have consented after a brief strike to have the matter arbitrated. A clear demand for an increased wage in face of a contract lasting till Apr. 1, 1918, would not have been so submitted, for the issue would have been decided almost before it was presented.

In What District Are the San Toy Mines?

The Peacock Coal Co. in the Pomeroy Bend district had a strike at one of its mines. commencing Labor Day, but the differences have been adjusted. The dispute in the San Toy mines of the Sunday Creek Coal Co. cannot be located in any particular district till the question is settled whether the mines are in the Crooksville district and take the Crooksville scale, as the mine workers claim, or in the Hocking Valley district, as the operating concern declares. The two mines have been idle for many months while new equipment was being installed, and now that they are finished the scale question becomes peculiarly acute. J. M. Roan is conducting negotiations for the coal company.

In Illinois, Frank Farrington, the energetic and competent state president of the United Mine Workers, has been charged with receiving $10,000 for his indorsement of Col. Frank L. Smith, of Dwight. Colonel Smith is the Republican nominee for governor. Farrington denies receiving $10,000, but it is said he admits accepting $1,000 for personal services, which he surely cannot excuse. His time belongs to the union, and if he gave only his own leisure moments they were not worth $1,000. Hence it is clear he was not paid for his time but for his influence. It is hard to regard payments of this kind as anything but bribes.

"All Mine Workers Union Men"

The Industrial Workers of the World is now clearly understood to be a rival and not a coadjutor of the labor union. It has invaded the unionized field and is competing with the unions, and the battle between them is now being fought to the death. As long as the Industrial Workers of the World interested itself in the unorganized, it received unofficial approval from the union men, and the violence of its methods was condoned. But from henceforth relationship with it is tabooed.

Action against the I. W. W. is not hindered by scruples that apply in dealing with union men, because it does not have the approval of either the employers or the majority of the employed. For this reason the state police in Old Forge felt justified in arresting 262 men at a large meeting of these lawbreakers. But when the time came to try them the grand jury did not return indictments, and Sheriff Phillips is so disappointed that he says he can no longer maintain the peace in that troublesome town.

It seems true that the broad net spread for the I. W. W.'s at the meeting caught some men who had no criminal intent. One man, for instance, Ralph Florimond, merely went to hear what was said, expecting that the meeting would declare for a return to work. He had been mining coal steadily, and when arrested his young boy sent in a heartrending letter to the sheriff, saying that the interest on the mortgage on his father's home was due, and the whole family was starving and needed the father's wages for their sustenance. The prisoner was immediately liberated.

Industrial Workers of World Plot in Peace

The Industrial Workers of the World has its organizers still at work. At Old Forge, on Sept. 30, it held a barbecue in a field and celebrated the release from jail of a dozen or more leaders of the organization whom the Lackawanna grand jury failed to indict for charges growing out of the round-up of the 262 men at the meeting mentioned. On Sunday, Oct. 1, more than 1,000 men held a mass meeting in a field, and their leaders are said to have urged the men to undertake a general strike, in violation of their contracts, and to resist the state police and the sheriffs. The Halstead mine of the Delaware, Lackawanna & Western Railroad Co., Coal Department, was tied up on Sept. 30 and about 1,000 men were laid idle. There was no disorder, and the only police activity was on the part of the Duryea officers, who kept the men from gathering in groups.

The union men are fully realizing the danger confronting them in the existence of a rival organization that can promise everything and being new cannot be compelled to make its promises and performances jibe. And so despite the fact that strikes for the 100-per cent. union are violations of the contract and that they have proved grievously expensive and unsuccessful at the mines of the Philadelphia & Reading Coal and Iron Co., and in the Shamokin division of the Susquehanna Coal Co., the union mine workers in other parts are striking for mines with union men only employed, and the union leaders condemn the strikes but apparently do it with a wink, for such suspensions suit their convenience quite well.

Seven hundred mine workers at the Lackawanna colliery of the Temple Coal Co. went on strike recently to compel 16 men to join the union. Even when 10 of these men complied, the strikers refused to go back to work till all the 16 had become members. It is said that the attempt to organize a branch of the Industrial Workers of the World at this colliery contributed toward the calling of the strike.

Enforcement of Law Drives Away Agitators

It is alleged that many Industrial Workers of the World of the worst class are leaving the northern anthracite field because of the active work of the police. It is also alleged that some few men are coming in from Minnesota and New York. Several women had planned to come and address the strikers, but have deferred their visit. The agitators seem lately to have paid more attention to the intimidation of the silk-mill girls, but without destroying their determination to work.

Guitano Frushano has confessed that he helped to dynamite the home of Michael Loughney in Pittston township on Sept. 16. The act was perpetrated to punish Loughney for

his refusal to leave the union and join the I. W. W.'s. Frushano declares he helped Joseph Pasquello and Joseph Sadula to obtain a half box of dynamite from the Boston mines, being forced to do so under fear of danger to himself.

A button strike was recently declared at the Seneca colliery of the Lehigh Valley Coal Co. at Pittston, but the men returned to work on Oct. 8. The strike was called by the mine local at the colliery to compel 30 or 40 mine workers to affiliate with the union, the nonunion men being members of the I. W. W. Because 50 men failed to pay their union dues at the Franklin colliery, the mines of the Lehigh Valley Coal Co. were idle for two days.

Not Urging Mine Employees To Join Union

It is quite generally stated that the Lehigh Coal and Navigation Co. is urging its men to join the union in order to prevent a "button strike" that would tie up the Panther Valley at a time when the shortage of labor and the resulting shortage of coal would make a shut-down disastrous. It has been openly declared that an agreement was made at Wilkes-Barre on Sept. 22 between S. D. Warriner, the president of the company, and M. H. Hartneady, president of subdistrict No. 1 of district No. 7. The agreement was said to bind the company to force all its employees to pay their union dues and required it to employ only men who had buttons to indicate their membership in the union.

This would amount to a promise to create a "closed shop"—a principle for which the miners have fought for years and which the operators, back by the Anthracite Coal Strike Commission, have steadily denied.

Both S. D. Warriner and Edwin Ludlow, who is the vice-president and general manager, deny that any such agreement exists. Mr. Warriner says that the matter was discussed at a meeting of the Conciliation Board; but while it was made a matter of lengthy discussion, nothing was done Mr. Hartneady, while not so clear as to the agreement, makes no question as to the fulfillment of its alleged terms: "The company has passed the word out, and the men are coming into the union so fast that we cannot take care of them. Over 800 have come in since Monday, Sept. 25, and after the next payday, which occurs about Oct. 6, we expect to have every man in the union."

Several of the operating companies are said to have been favorable to the complete unionization of their employees. It seems likely that the rumors that subordinate officials have urged nonunion mine workers to join the union are not without foundation. Whether these subordinate officials received their impulse from the heads of the companies is open to more question.

Struggle in Somerset County Still Uncertain

J. Blair Kennerly's Pretoria mines at Holsopple seemed some little while ago to be about to run with regularity and with a suitable force of men, but the union got control of some of his new miners and made a demand on him requiring union conditions of work and union jurisdiction. This he refused, so on Tuesday, Sept. 26, his force of men was reduced to five; and even these ceased working on Sept. 28.

The next day he had protection for his men and eight miners working. On Oct. 2 the question of continuing the strike against Kennerly was considered in the local, and continuance was voted. The number of miners in the Pretoria, however, has increased to 14, and it is hoped that the trouble will ultimately come to an end. Mr. Kennerly is willing that the men should have a checkweighman, but he will not collect the man's deductions nor check off the dues of the union. The men will not consent to this, as they still hope to get full union conditions, including both the check-off and the pit committee.

The Victor Coal Mining Co.'s experience with the union does not encourage Mr. Kennerly. The Victor company has been operating for some time under union jurisdiction. Some time ago, in lieu of a checkweighman the company allowed the men to elect the company's weighman, who was thereafter still paid by the company. But he did not satisfy the miners and they selected another, and the former weighman went to work elsewhere. The miners were more grievously dissatisfied with the second man and now are asking to have the first man back. The company will not consent to this, and the mine workers threaten to strike unless their demand is granted.

Farther south the United Mine Workers appear to be less active. The mines of the Knickerbocker Smokeless Coal Co. and those of the Baker-Whitely Coal Mining Co. at Hooversville, as well as those of the Stauffer-Quemahoning Coal Co. at Listie, are increasing their output.

As in other parts of the country, the collective bargaining of the miners is causing collectivity in the operators. It is strange to hear the miners allege that the unionism of the operators forced collective bargaining on the mine workers, for the reverse is true. Every little while a mine worker admits that there is no truth in his contention by saying, "We have to unionize the mine operators first, for otherwise we cannot make a bargain with them." The miners are usually at odds, but the operators frequently are even more so; and the labor leaders sigh, "If only we could get them together." Yet as a matter of fact they don't want them to agree too closely. They want a few weak ones among them to lead the rest into concessions, and the only disunity they decry is due to the firmness of those who refuse to be cajoled.

In Somerset County the same evolution is taking place. The operators are being unionized, not in this case to make a bargain, but to prevent one being made. The attacks of the union are bringing them together. A county coal operators' association along the lines organized in other states is being discussed. Soon there will be a labor commissioner, and the evolution will be fully consummated.

What Are Miners' "Supplies"?

The mine workers in the anthracite region argue that the coal which they burn in their homes is comprehended under the term "supplies" in clause No. 5 of the recent agreement which reads, "The present prices of powder and miners' supplies as established at the several collieries in the region shall be continued without charge throughout the term of this agreement."

The mine workers claim that anything supplied by the company, wherever it may be used, is included under the head "supplies," and urge that the price of coal to the miner has been regulated in the past in other sections by such a restriction.

The anthracite companies, however, point out that "powder and miners' supplies" would take a large meaning if it included coal, the whole outward appearance of the clause being against such a construction. While the anthracite region has no company stores, if it did have the clause might be declared to include all manner of store merchandise also, the rates for which in practice have never been so regulated. In fact the word "supplies," which might broadly be taken to include all things supplied, in its context can hardly mean anything in the anthracite region except what is supplied for purposes of aiding in the extraction of coal.

The matter was submitted to the Conciliation Board on Oct. 7, and the board members disagreeing, the question has been left to the umpire for settlement.

Butler-Mercer District Gets a New Wage Scale

The Pittsburgh district, No. 5, of the United Mine Workers of America was at the last biennial meeting of the union the third largest bituminous district in the United States. It runs far below the Illinois district, No. 12, but very close to Central Pennsylvania, No. 2. In fact only those who are well acquainted with the headquarters of the Union could tell just whether the Central Pennsylvania or the Pittsburgh district would now occupy second place in a roster of bituminous districts duly rearranged in the order of their numerical importance.

Central Pennsylvania has unionized the County of Indiana and made some increases in Somerset County. The Pittsburgh region has made additions to its strength in Allegheny County and in the Butler-Mercer field, and President Philip Murray of that district has just signed a contract in the latter field that gives substantial increases to the mine workers—somewhat better than those awarded to the generality of miners by the New York Agreement, though not quite equal with those obtained by the long unionized part of the Pittsburgh district.

The agreement was signed in Greenville, Mercer County, Penn., Sept. 28. It will apply to about 2,500 union men and 4,250 employees. It increases the pick-mining mine-run rate per short ton from 60 to 64c. The machine-mining rate has the following increases per short ton: Undercutting with puncher machines, 14c. increased to 15.2c.; loading after punchers, 32.8c. increased to 36c.; undercutting with chain machines, 34.1c. increased to 37.5c.; loading after chain machines, 34.1c. increased to 37.5c.

The agreement also provides a 5 per cent. advance on all day work, dead work and yardage rates as provided in the New York Agreement.

Strike Against Electric Lamps

Three thousand miners employed by the Vandalia Coal Co. inaugurated a strike at 3 p.m., Saturday, Sept. 16. It threatens to be one of the most important in the history of the state of Indiana. An order by officials of the Vandalia Coal Co. directing miners of mine No. 10 at Dugger, Ind., to wear electrical safety lamps is the cause of the contention.

Notice was posted at the Dugger mine during the summer to the effect that all men employed underground should wear electric safety lamps as a safety precaution against inflammable gas, the order to be effective July 21. The men refused to obey this order and were upheld by the executive board officials of District 11, United Mine Workers of America. Conferences have been held several times between officials of the coal company and the district officials of the United Mine Workers, but to no avail.

On Tuesday, Sept. 12, District President Edward Stewart, in an attempt to bring about a settlement, called a strike of men employed in the Vandalia mines, giving the company five days' notice. The mines affected were numbers 8, 9 and 20, and the Little Giant in the Linton field; Clover Leaf, number 10, and the Gillmore mine in the Dugger field; the Lattas Creek mine in the Jasonville field, and the Liggett mine in West Terre Haute.

Extend Sympathy Strike to Monon Coal Co.

Attempts were made to have the mines of the Monon Coal Co., which was absorbed by the Vandalia some time ago, exempted from the strike order. The four mines are claimed by the Vigo Mining Co., of which Attorney Paul N. Bogart is president. He held a conference with President Stewart recently in an effort to keep the men at work in these mines. Mr. Bogart stated:

A year ago last March the Vigo Mining Co. leased the Little Giant, the Gillmore, the Lattas Creek and the Clover Leaf mines from the Monon Coal Co. The Vigo Mining Co. has no organization and employed the Vandalia Coal Co. as its agent to operate the mines.

We furnished the working capital, paid the men in our own name, as the pay envelopes will show, and applied to the state industrial board to carry our own risk under the workmen's compensation law of Indiana. The Vandalia Coal Co. has not a shadow of interest in the Vigo concern. The same people are not interested in both properties. It is manifestly unfair for the miners' executive board to issue a strike order against us.

President Stewart of the Mine Workers declares the company to be under the direction of the same men who own the Vandalia and said:

The Vigo Mining Co. is operated, managed and controlled by the same people as is the Vandalia Coal Co. The manager of the Vigo Mining Co. is on the payroll of the Vandalia Coal Co. He is controlled by it and is under the direct supervision of its directors. The superintendent of the Monon mines, Wesley Harris, used formerly to be on the payroll of the Vandalia Coal Co.

Since the strike order was issued he severed his connection with the Vandalia company and accepted employment as the superintendent of the Vigo Mining Co. I consider this only a subterfuge and as a scheme to mislead the miners in the fight at issue.

The strike arises from the attempt of the Vandalia Coal Co. to replace the dangerous open light with approved safety lamps. The contentions of the company were brought out Saturday, Sept. 16, in a lengthy statement which covers every detail of the dispute. It is as follows:

Vandalia Declares Open Lights Unsafe in No. 10

Vandalia number 10 mine is a particularly hazardous working to operate with the so-called "open," or "naked," light, owing to the fact that the strata immediately overlying the coal carry a considerable quantity of gas, which is liberated whenever the roof falls. In the old workings of the mine this hazard has been controlled by building brick brattices, or walls, that completely shut off these old operations from the live or working portions of the mine, but although during the last several years the utmost care has been exercised in the operation of these live workings, occasional falls have occurred, releasing gas near places where the men were working. Invariably an open light carried by one of the men has ignited the gas and caused an explosion.

Some of these explosions have been extremely serious, and on at least four occasions one or more men have been killed and several others badly burned. Various changes in methods of operating the mine and new rules governing the conduct of the men in case of danger have been tried by the company to avoid repetitions of these explosions. But although the dangers have been reduced and many accidents have been avoided through the continual vigilance of the management, occasional explosions still occur. So long as the roof continues to fall unexpectedly, as it always will, and men work in proximity thereto with naked lights, the hazard will still remain, and there will always be the danger of a catastrophe in which many lives may be lost.

Ascertained Electric Lamps Were a Success

With this danger continually in mind, the officers of the company have made a constant effort to find a satisfactory safety lamp to be used at the mine. Trips have been made to Pittsburgh and other places where the same conditions prevail, and the company has corresponded with the United States Bureau of Mines, with the mine inspection departments of different states, and with mining men from various parts of the country. Various sample lamps have been tested in the mine during the last two or three years, but it was not until the early part of last year that a lamp was developed that satisfactorily met all the requirements of the miner and of the United States Bureau of Mines.

As soon as the company learned of this lamp it placed an order with the Mannesmann Light Co., which manufactured it, for a sufficient number to equip number 10 mine, actively attempting at the same time to push negotiations with the miners, which had been under way for some time, to determine on what basis the lamp should be installed—that is, how much per lamp shift should be paid to the company by the men for the use of the lamp. Under the present contract with the miners in Indiana, the miners are supposed to furnish their own lamps and caps, and all the figures available on the present cost to the miner indicate that they are now paying a little more than 6c. per lamp shift to own and maintain their own lighting equipment.

The Mannesmann Light Co., which is a German corporation, was unable, however, to secure certain of the lamp parts that were made in Germany, and after many failures on the part of the company to make deliveries as promised, the Vandalia Coal Co. was forced to place the order with the Mine Safety Appliance Co., which handles the Edison lamp—a lamp that also has been approved by the United States Bureau of Mines and the inspection departments of Pennsylvania, West Virginia and Colorado, where it has become a standard lamp for use in gaseous mines.

Mine Workers Would Not Discuss the Issue

In the meantime in order that an agreement might be made on a basis of installation the company continued its efforts to meet representatives of the miners, either men appointed by the local union or persons nominated by the state officials. But the miners and their representatives, although they continually promised to meet, always avoided setting a time. Finally the officials of the company, finding themselves completely frustrated in their efforts to make an agreement whereby the lamps could be installed, came to the conclusion that it was foolhardy to continue to longer operate the mine with the open-lamp hazard. It decided to insist that all men working at the mine should use the safety lamp that the company had already provided. This decision was reached after another explosion had occurred July 27, 1916, in which good luck intervened to save a number of men from injury and possible death. After making this decision the company had printed and posted the following notice:

"On and after Monday, July 24, 1916, no naked lamps or lights of any kind will be permitted in mine number 10. Edison safety lamps, which are approved by the United States Bureau of Mines, will be supplied from the lamphouse to every man entering the mine. It has been determined that the present cost to each miner of providing and maintaining his own oil or carbide lamp is not less than 3c. per lamp shift, and a charge of that amount will therefore be made and deducted from the payroll for the use of the new electric safety lamps. The company is prepared to meet a committee from the miners at any time to discuss and verify the amount of this charge.

"VANDALIA COAL CO.,
"By John Hewitt, General Manager."

Assistant Mine Inspectors Approve of Lamp

About the same time that the foregoing notice was printed the state industrial board of Indiana sent out notices for a public hearing to determine whether or not the Edison safety lamp was a proper safety device. At this hearing, among other evidence introduced, was a report of two of the assistant mine inspectors, Mr. Moore and Mr. Fennel. Each of these inspectors submitted a separate report, and both reports declared that the lamp was a safety appliance and should be installed.

Each of these reports, however, went on to suggest that other safety measures might also be adopted by the company in order to further insure the safety of the men working in the mine, but these suggestions did not affect the installation of the lamp itself, and were only supplemental to the recommendation in regard to the lamp. But the miners have attempted to make much of these supplemental recommendations, arguing apparently, that if the company could not make the mine 100 per cent. safe it should not attempt to make it 75 per cent. safe. In other words, no attempt toward improvement should be made until perfection was assured.

After carefully considering the reports of these mine inspectors and interrogating them personally at the meeting, every member of the inspection department, replying positively and in the affirmative to the direct question asked by the industrial board, "Do you regard the installation of the Edison safety lamp a safety measure?" and after hearing other evidence introduced by the coal company and by the Indiana State Bituminous Coal Operators' Association, which was represented by Phil H. Penna, secretary, the three members of the board announced their decision in regard to the matter to the effect that the evidence showed conclusively that the Edison electric mine lamp was a safety appliance, and they later made a written decision as follows:

Industrial Board Gives Written Indorsement

"For some time the industrial board has had under consideration an investigation of the question as to whether or not the electric safety lamp proposed to be installed at Vandalia mine number 10 is a proper safety appliance. As a result of the board's investigation, it has arrived at the conclusion that such electric safety lamp is a proper safety appliance.

"Section 8 of the Indiana workmen's compensation act provides:

"'No compensation shall be allowed for an injury or death due to the employee's willful failure or refusal to use a safety appliance or perform a duty required by statute.'

"If the electric safety lamp shall be installed in Vandalia mine No. 10 and an employee shall meet with a personal injury due to his willful failure or refusal to use such appliance, then the above provision of this section shall apply to his case.

"INDUSTRIAL BOARD OF INDIANA.
"Howe S. Landers, Secretary."

Unfortunately, the miners had not been present at this meeting and after learning of the decision of the board, the miners asked for a rehearing of the case, which was granted and on Aug. 12, 1916, the mine inspection department, the miners' organization, the coal operators' association and the Vandalia Coal Co. were called before the industrial board and the case was again threshed out.

After everyone present had been given full opportunity to express his views, the board decided it could see no reason to reverse its previous decision that the lamp was a proper safety appliance, and the decision still stands. At this meeting both Edgar A. Perkins, chief of the industrial board, and Michael Scollard, chief mine inspector, said definitely that the lamp was a proper safety appliance and urged the miners' representatives to insist on the No. 10 men adopting the lamp and returning to work, the mine having been on strike since the notice before mentioned was posted.

Under Pressure Inspector Reverses Decision

At this meeting one of the assistant mine inspectors apparently changed his original position in regard to the lamp, and in response to a direct question from one of the miners' representatives said he did not think it was a proper safety appliance for number 10 mine. What governed him in making the statement he only knows, but his attitude apparently had little effect upon Michael Scollard, to whom he reports, or upon any of the members of the industrial board, as immediately after this statement they made their decision not to change their original opinion that the lamp was a safety appliance.

The miners' officials, however, in reporting to their men, have absolutely misrepresented the mine inspection department's position, claiming that the statement of the assistant mine inspector was the decision of the mine inspection department, thereby seriously misleading the miners all over the state, and particularly those at No. 10 mine. The individual miner does not understand that the mine inspection department is merely a subdepartment of the industrial board, and that when the industrial board speaks, as it did speak in its decision above referred to, it is the state mine inspection department speaking.

Shortly after this last hearing before the industrial board the officials of the coal company were able, for the first time, to get officials of the miners' organization and a committee from No. 10 mine to meet them in an effort to reach a basis for settlement on the safety-lamp difficulty.

Little Danger of Igniting Gas in Shot Firing

At this meeting the miners advanced the only serious question that has ever been raised in connection with the installation of the lamp; namely, that if the men work all day in the mine with the electric safety lamp, there is a bare possibility that some gas might collect in their working places during the day which might be ignited at the time of lighting the shots in their working places just before leaving the mine.

This possibility, which happens to be extremely remote at this particular mine, has been acknowledged by the officials of the coal company from the start and they sought to eliminate any possible question of danger from this source by offering any one of a dozen different practical solutions. At the meeting above referred to, however, all of these suggestions were rejected by the miners' officials without an attempt to consider them seriously and almost immediately thereafter, the company was served with a five days' notice that if it did not at once start No. 10 mine, allowing the men to use the open lights, all its mines would be called out on a strike Aug. 28.

Action on this notice, however, was deferred on account of a meeting arranged for Aug. 29, which was attended by the Indiana coal operators' executive board, the miners executive board, the committee from No. 10 mine, Vice-President Hayes and Secretary-Treasurer Green.

In the morning preceding this meeting the following tentative agreement was drawn up by John Hewitt, general manager of the Vandalia Coal Co., and the officials of the miners' organization, which agreement the miners' representatives agreed to recommend to the men at No. 10 mine for approval:

Miners' Committee Makes Recommendations

"Memorandum of agreement between Messrs. Stewart, Hendrickson, Mitch and Terry, representing the miners of the Vandalia Coal Co., mine No. 10, and Mr. Hewitt, general manager of Vandalia Coal Co., covering settlement of lamp controversy at said mine.

"It is hereby agreed that No. 10 mine shall resume work at once, using the Edison electric mine safety lamp, for a period of 30 days under the following conditions: (1) The miners shall pay the company for the use of said lamps 3c. per lamp shift. (2) The company shall employ necessary additional inspectors to examine the working places before firing time. (3) If, at the expiration of 30 days, the use of the lamp has developed any conditions that require adjustment in order to assure the safety of the men using the lamps, all said conditions shall be taken up by the same committee, whose names are attached hereto, for adjustment, and in the event of their failure to agree, the committee shall be enlarged by the addition of one or more of the three national officials of the miners' organization and Michael Scollard, mine inspector, the latter having the right if he so desires, to call upon any of his assistant deputy inspectors to assist in the negotiations. It is distinctly understood between the parties hereto that the mine shall continue at work pending final settlement of all questions as to the use of the lamp."

When the meeting convened in the afternoon, however, the miners' officials objected to the agreement as drawn and after much effort the following agreement was redrafted and signed by Mr. Freeman and Mr. Penna, of the coal operators' association, and by Mr. Stewart and Mr. Mitch for the miners' organization, and by Messrs. Hendrickson, Terry and Bridges for the miners' local union of No 10 mine.

Committee Modifies the First Recommendation

"The question of the use of the Edison electric mine lamp at No. 10 Vandalia mine at Dugger, Ind.

"It is hereby agreed that the mine shall start work with the use of the Edison electric mine lamp for a period of 30 days and at the expiration of said time, if any questions arise in connection with the use of said lamp, the same shall be taken up with President Stewart for the mine workers and P. H. Penna for the coal operators, the miners agreeing to continue at work while negotiations are pending.

"It is therefore specifically understood that nothing herein shall prevent the taking up of this question, as per Article VII, Section 2, of the Terre Haute agreement, and that there shall be no charges for the use of the safety lamp for 30 days while on trial. The use of said lamp shall be taken up and adjusted under Article VII, Section 2, of the Terre Haute agreement.

"After the expiration of 30 days, the miner shall pay for the use of said lamp, not to exceed 3c. per lamp shift, until a definite decision has been reached as to its use.

"It is further agreed that the chief mine inspector, Michael Scollard, be requested by both parties to this agreement to visit and inspect said mine and make such recommendations as he deems necessary to safeguard the miners using said lamps.

"It is further agreed that in the event of the failure of Mr. Penna and Mr. Stewart to settle any question which may be referred to them under the agreement, such question shall be referred back to the joint committee of representatives of operators and miners who were present at a meeting held on Aug. 29, at which this agreement was drafted.

"It is understood that the acceptance of this proposition is subject to the approval of the miners at No. 10 Vandalia mine, local No. 75, United Mine Workers of America, Dugger."

This agreement was signed by W. J. Freeman, president, and P. H. Penna, secretary, of the Indiana Bituminous Coal Operators Association; by Ed. Stewart, president, and William Mitch, secretary, of the United Mine Workers of America, District No. 11, and by Hendrickson, Terry and Bridges, of Local Union No. 75.

Committee Failed To Urge Recommendations

With the signing of this agreement the miners' representatives pledged themselves to attend a meeting, to be called at No. 10, for the purpose of explaining the agreement and urging its approval. For some reason the miners did not keep this pledge. Instead an impromptu meeting was held on the Friday following, which was attended by only a portion of the men and not at all by the miners' officials. At this session no attempt was made to explain the agreement or urge its adoption, with the result, of course, that the miners failed to take favorable action thereon—some of the men claiming that no action at all was taken and others claiming that the agreement was proposed and voted down. Following the last meeting, Sept. 12, John Hewitt, the General Superintendent of the Vandalia Coal Co., received the following communication from the miners' organization:

"We have this morning sent out order to all the secretaries working at mines controlled and operated by the Vandalia Coal Co. to instruct their men to cease work on Saturday, Sept. 16, 1916, unless a settlement is reached in the dispute at No. 10 mine, Dugger, Ind.

"EDWARD STEWART, President.
"WILLIAM MITCH, Secretary."

The lamp which the company is attempting to install has been approved by the United States Bureau of Mines and the mine inspection departments of the various states where it has been introduced, and it is used extensively in the states of Pennsylvania, West Virginia and Colorado. In Pennsylvania the same miners' organization which exists in Indiana has a contract with the operators whereby the miners use the lamp and pay 5c. per lamp shift therefor, instead of 3c. which the Vandalia Coal Co. advised in its notice that it would charge. Some of the Pennsylvania mines visited by officials of the Vandalia Coal Co., which are using this lamp have conditions practically identical with those at Vandalia No. 10 mine. Explosions were a common occurrence before the installation of this type of safety lamp in these mines. They are now the rare exception, in most cases having been practically eliminated.

Weight and Convenience in Favor of Lamp

Some of the men in Indiana complain that the lamp is burdensome, gives a poor light and will reduce their earning power. This is absolutely absurd, as the battery weighs only 2¾ lb., the cap and lamp weighing practically the same as those the men now use. At the present time, instead of a small compact battery conveniently strapped around their waists, the men carry flasks of water and cans of carbide with which to replenish their lamps and before the introduction of carbide, they carried oil flasks.

These articles unquestionably weigh at least 2 lb., so that the difference in weight in what the mine workers are now carrying and what they would carry with the electric safety lamp could not exceed 1 lb. The angle of reflection of the electric lamp is wider than that of the carbide lamp, and the light is better. In all districts where the lamps have been used there has not been a fraction of a cent reduction in the earning power of the men. In fact, all the data available on this subject show increased earning power, and from every locality comes only unqualified praise as to the efficiency, convenience and effectiveness of these lamps in preventing explosions. More than 40,000 of these lamps are now in use in this country, and the demand is far in excess of the supply.

Knowing all these facts, it seems amazing that such a condition as is now found at No. 10 mine can exist. The state miners' organization has set itself in opposition to the decision of the state mine inspection department and of the industrial board of its own state; in opposition to the decision of all the other state mine inspection departments where the lamp has been tried; in opposition to the decision of the United States Bureau of Mines, which decision was reached only after long and careful tests and observations.

Yet the miners' officials still threaten to call out on strike all of the mine workers employed by the Vandalia Coal Co., about 3,000 men, because that concern will not recede from its determination to install, at considerable expense to itself, a well-recognized and universally approved safety appliance which will reduce to a minimum the possibilities of a repetition of the numerous explosions that have occurred at its No. 10 mine, and by so doing give much greater protection to the men working there.

The Vandalia Coal Co. has taken a firm stand in support of the nation-wide safety-first movement and the prevention of accidents, and the local miners' organization has placed itself directly in opposition thereto.

A. M. OGLE, President,
JOHN HEWITT, General Manager,
Vandalia Coal Co.

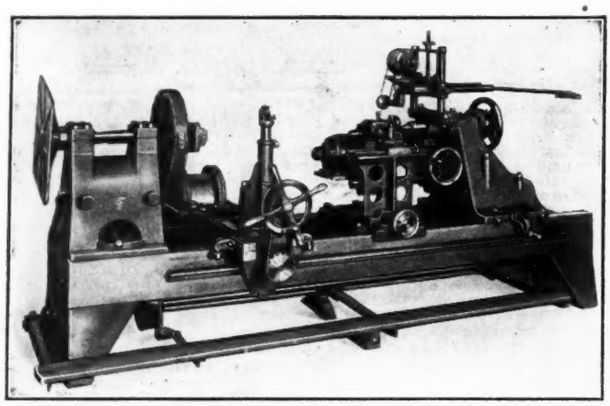
New Apparatus and Equipment

A New Armature Machine

The new Peerless heavy duty armature machine, shown in the accompanying illustration, has been recently placed upon the market by the Electric Service Supplies Co. This machine is intended to be complete within itself. It consists of a banding machine suitable for handling any size of railway or locomotive armature from the lightest to the heaviest. This has a self-contained tension carriage for band wire.

There is also embodied in the complete device a commutator slotting machine with independent motor, a commutator truing or grinding attachment, also with independent motor, and a field and armature coil plate mounted on the main spindle, suitable for all classes of form coil winding.

After an armature has had the coils placed in the slots and the leads soldered to the commutator, it may be put into this machine and the work completed with dispatch. As a binding machine this is capable of extremely



THE NEW ARMATURE MACHINE

heavy duty, the speed of rotation being under perfect control of the operator, and upon stopping the machine it automatically locks and prevents slack accumulating on the band wire by the backing motion of the armature. An even and uniform tension on the band wire is secured by means of a portable type of tension machine mounted on the carriage, which is adjusted upon rails provided in rear of the machine so that it may be readily brought into position when changing from one band to another.

The commutator slotting attachment is supported from a bracket on the tailstock and is removed by loosening two capscrews. Two vertical rods support a casting from which two other rods project over the commutator. These carry a sliding head on which is bolted the bearing for the milling saw arbor. On top of the sliding head a ⅛-hp. motor is mounted for driving the saw. The casting supporting the projecting rods is adjustable vertically to suit different diameters of commutators and also to regulate the depth of the cut. Provision is made to skew the travel of the saw in order to follow the mica slots when these are out of line. The sliding head carrying the saw is moved across the commutator by means of a lever which can be adjusted to suit the length of slot desired, and for the convenience of the operator.

The commutator truing and grinding attachment consists of a traveling grinding wheel. Two steel rods project backward from the tailstock sliding upon which is a casting that supports a ½-hp. motor and the two rods carrying the grinding wheel parallel with the face of the commutator.

These rods are adjustable in and out to suit the length and location of the commutator. The grinding wheel is moved along the rods by means of a screw and hand wheel and is set against the commutator by a screw. Cutting may be done in both directions of travel of the wheel. When this attachment is not in use it is simply moved back out of the way and no part is disturbed. The rods and all other parts are made heavy to prevent springing and chatter.

A coil-winding plate is mounted on the end of the spindle, and is arranged to take all standard sizes of armature and field coil forms. As the speed of this plate is under instant control of the operator, it is suitable for all classes of work from the lightest to the heaviest.

The machine is heavily constructed throughout, all castings being fully ribbed and the bed consisting of a heavy steel section planed true on the bearing surface and mounted upon legs.

The machine is stopped and started by a foot treadle which runs the full length of the bed so that control is possible from any location. When this treadle is depressed to stop the machine a locking brake is automatically applied to the driveshaft. The foot treadle is connected to an automobile type leather-lined cone clutch for controlling the machine by connecting to the main driveshaft. This type of clutch is simple and will not jerk when engaging, a smoothly operating clutch being necessary for successful banding or coil winding. The exterior part of the clutch is free to revolve upon the shaft and is crowned ready to receive a belt from the lineshaft direct, no countershaft being necessary.

For direct motor drive a gear is bolted to the loose member of the clutch and the motor is placed upon a suitable support at the proper height to accommodate the pinion employed. The motor capacity necessary is 1½ hp. and the speed from 900 to 1,200 r.p.m.

The headstock is a large casting and contains all the reduction gears, which are thus fully protected. Power is transmitted from the lower driving shaft by steel chain to a double set of gears of different diameters mounted in the headstock, either of which may be thrown into engagement by a lever. This lever may also be thrown into a neutral position, in which case the main spindle is free to revolve independently. This is a valuable feature in coil winding and in case any special work is to be done on the armature.

Two gears on the first shaft above referred to engage with two corresponding gears on a second shaft, giving

two instantaneous changes of speed while the machine is running. The second shaft on the outside of the headstock carries a driving pinion which engages the faceplate gear. Self-contained with this gear is the driving dog, which is clutched between the teeth of the pinion on the armature, all extra attachments for this purpose being eliminated.

The main spindle, which is of steel, runs in adjustable bearings. The centers are of tool steel and removable. These heavy-duty armature machines are supplied complete with all or any attachments, or as a complete heavy-duty armature banding machine only.

A General Utility Jack

Templeton Kenly & Co., Ltd., of Chicago, Ill., has recently placed on the coal-field market its Simplex jack No. 310 as a general utility device. This jack is of strong and rugged construction and embodies features that render it available for a multiplicity of purposes at the mine, either above or below ground.

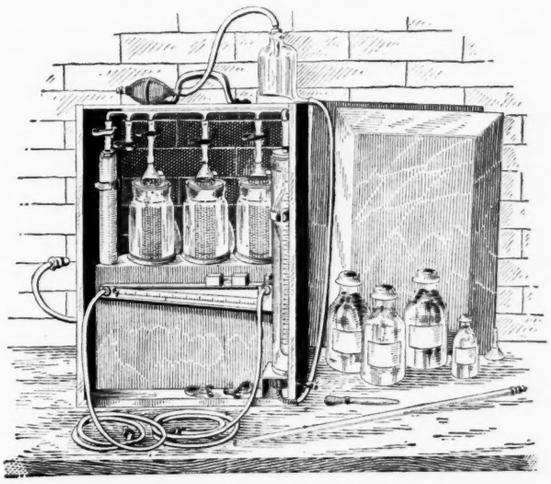
The chief advantage of this jack lies in its tilting base, as may be seen from the accompanying illustration. This base is attached to the body of the jack by a hinge joint and may be locked in a position at right angles to the center line of the body; or, upon releasing the catch, the base may be tilted through an angle of almost 90 deg. The hinge pin passes through an elliptical hole in the hinge joint so that the thrust of the jack is taken directly by the foot and does not put a shearing stress upon the pin. The bottom of the foot is provided with suitable calks to prevent slipping when the jack is placed in an inclined position.

The adaptability of this jack to the general run of work encountered in and about a mine is extreme. The tilting base makes it unnecessary to provide a level footing when a vertical lift is necessary, or an inclined footing when an inclined lift is to be made. This is a great time saver when quick work, such as the replacing of a locomotive or car that has jumped the track and is blocking the entire transportation system, is to be performed.

Besides its applicability for emergency work on locomotives, etc., this tool may be used as an ordinary track jack, being provided with a suitable lifting foot, for the forcing to place of heavy mine timbers, and for the lifting and moving of coal cutters, or for other purposes.

Dwight Furnace-Efficiency Case

The three symptoms which indicate good or bad furnace conditions and combustion efficiency are flue-gas analysis, flue-gas temperature and draft. The first two factors show the degree of efficiency, and the draft helps to locate trouble when present. The Dwight furnace-efficiency case contains instruments for measuring all of these three factors, comprising a flue-gas apparatus, a draft gage, and a thermometer together with the necessary tubing, chemicals, funnel, filler, extra parts and a book of instructions giving in detail the proper methods for using the outfit.



DWIGHT FURNACE-EFFICIENCY CASE

This apparatus, which has just been adopted by the Carnegie Steel Co. after investigation, is being put on the market by the Dwight Manufacturing Co., 12-14 South Jefferson St., Chicago, Ill.

The Exact Relation of Clinkering to the constituents of the ash is not known so well that one can definitely predict from an analysis of the ash whether a coal will or will not clinker. At many power plants the fireman slices the fire too often and works the ash up from the grates into the hot coal bed, where it melts and fuses into heavy, dense masses of clinker. At high rates of combustion the ash in a given coal may clinker (though at lower rates it does not) because of the ash being raised to the fusing temperature.

A SIMPLEX JACK IN OPERATION UNDERGROUND

Editorials

Some British Subsidences

Scranton doubtless thinks that it has a problem in its subsidences not duplicated in severity in any other mining district. If misery truly loves company, it can find some cold cheer in learning that Northwich in Cheshire, England, not far from the cities of Liverpool and Manchester, has a problem vastly larger and more distressing.

And, what is more, the persons who are causing these subsidences in many cases do not own the mineral rights under the land thus deprived of support. They do not have any survey themselves, nor has one been made by anyone else, of the mineral removed. Moreover, the majority, at least, of the suffering land holders have never signed a waiver of damage.

Yet the people of Northwich, like the people of Scranton, feel that they would be wronged if they were to lose the industry that at once feeds and distresses them. And they have patched the matter up much as the Bureau of Mines has recently recommended in Scranton. They are not stopping the withdrawal of mineral, but they are rebuilding the houses, resurfacing the roadways and letting the work continue.

However, in some places big lakes called "flashes" are being formed in which of course no building can continue to be inhabited. These lakes are growing steadily. In many places it looks as if Witton and Marston, suburbs of Northwich, would be like Sodom and Gomorrah—completely inundated and that salt in that case would be the cause of their untimely and unforeseen undoing.

The deposit of coal under Scranton is about 65 ft. thick when all the veins are counted. The mineral deposit at Marston is in places 182 ft. thick, but when all the damage is done perhaps another 50 to 100 ft. reduction of surface level may ultimately take place. The level of the town above the sea is less than 100 ft., so the higher spots in the landscape may some day become navigable to ships of heavy draft.

The material being removed in these Cheshire towns is rock salt. The industry, when it first started, was conducted by evaporating the water from brine. Later, mines were started in the top bed of salt, which in places was 84 ft. thick. Pillars were left to support the roof, which roof was about 130 ft. in aggregate thickness.

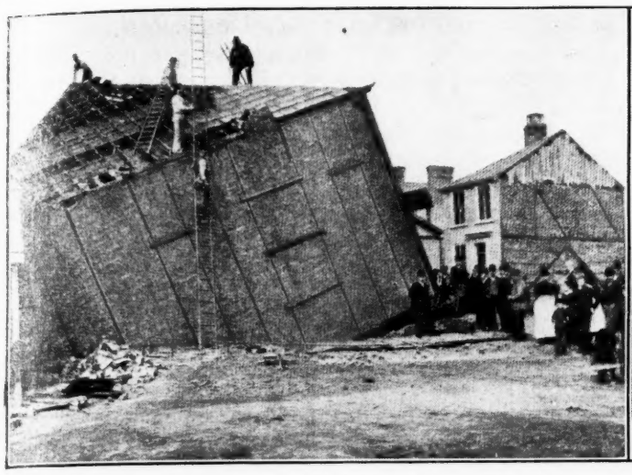
The material over the salt consisted of a marl with gypsum, which was impervious to water but somewhat readily disintegrated in the air. This marl was covered by glacial drift and has had almost as many years in which to become compacted as the coal measures of the Carboniferous era. It seems to constitute a strong roof, though this quality is not recorded by the authority Calvert.

The mines stood well, with pillars from 24 ft. to 30 ft. square and 75 ft. apart—till the water got in and dissolved the bottoms of the pillars so that in some instances they actually hung from the roof instead of sup-

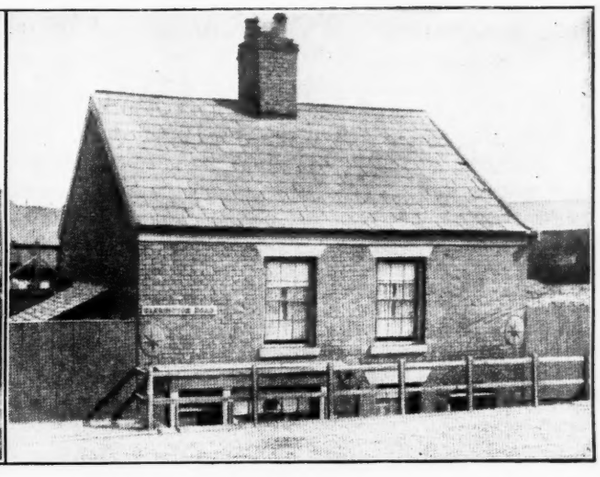
Courtesy of "Salt in Cheshire."

HOW THE CITY OF NORTHWICH, ENGLAND, HAS BEEN RUINED BY THE REMOVAL OF MINERAL

Solicitor's office on Castle St. drops into cave hole — Periodically streets are raised above the river level

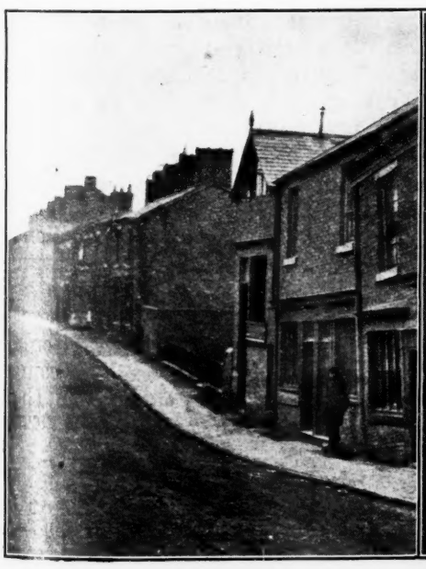


Subsidence in Northwich, a town of 18,000 inhabitants



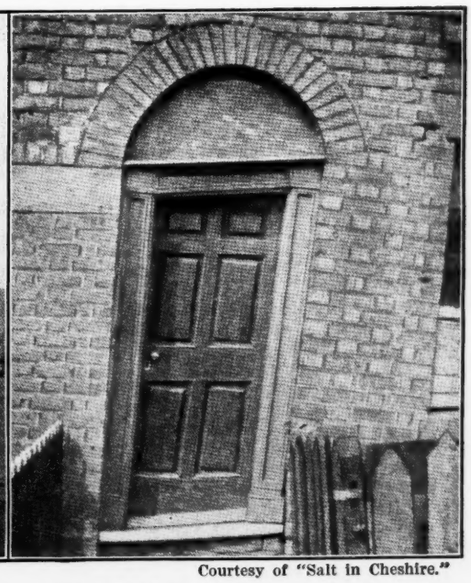
House and road both sunk, but the road was raised

The road in front of these houses was raised 20 ft. in 20 years. None of the buildings are now standing. Note how the road is flooded, showing that one of the celebrated Cheshire "flashes" is in process of formation



Witton St., Northwich, has developed rolls like those in North Main Ave., Scranton

A hotel that leaned out of line and looked down the Northwich street



Courtesy of "Salt in Cheshire."

Little wonder the citizens found their doors and windows would no longer open

STREET SCENES IN THE CHESHIRE SALT DISTRICTS OF NORTHERN ENGLAND

porting it, and a rope was passed under one of them as it hung thus precariously in mid-air. It constituted only an additional burden to the roof it was supposed to sustain.

Then, as the mines became flooded from the surface and from one another, they were gradually abandoned. Only the Adelaide is now working. Brine pumping replaced mining and no one knows where the brine comes from. It may come from the restricted top measure or from the more extensive and equally thick bed roughly 30 ft. below or from other thin pure beds still deeper or from some of the many mixed beds of salt and marl. It may originate far away from the shaft out of which it is pumped. Like oil, gas and undomesticated animals (*ferae naturae*) it is the property of the person who can manage to find and confine it within the bounds of his own land.

And so the trouble has been widespread though the property loss apparently has been the worst feature. Albert F. Calvert's "Salt in Cheshire," a remarkable book from which this information and these illustrations have been taken, mentions only one instance in which persons were killed. This was when the Ashton mine collapsed on Oct. 16, 1838. At this mine the top bed had been worked and the shaft had been sunk to the lower bed. Suddenly, the engine house, the rock-salt house, the bankman's house, the stable and the wheelwright's shop fell in and engulfed twelve persons, of whom seven lost their lives.

It would be interesting to quote several passages from Calvert's book, but there is space for only two. One, especially, taken from an issue of *Chambers Journal* in 1879, is well worthy of reproduction:

> The first thing that strikes a stranger is the dilapidated appearance of the houses and the uneven surface of the streets and roads. As he walks down the main street a number of miniature valleys seem to cross the road, and in their immediate neighborhood the houses are, many of them, far out of the perpendicular. Some overhang the street as much as two feet, while others lean on their neighbors and push them over. Chimney-stacks lean and become dangerous, while doors and windows refuse to close properly.

The London *Times* in 1882 discusses the "flashes" of which mention has been made:

> The immense lakes or bodies of water of many hundreds of acres in total extent, which are to be seen in the neighborhood of both Northwich and Winsford and are locally called "flashes," are the work of subsidences. These "flashes" were at one time the flat meadows bordering the Weaver or some of its tributary brooks. This land has sunk until it has become covered with water. These are not merely shallow swamps, but lakes varying from a few feet to fifty, and over many acres they are from 30 to 40 ft. in depth.
>
> The largest flash, which is called "The Top of the Brook" and is nearly the shape of the letter L, has a length in each arm of about half a mile with a breadth averaging fully a quarter of a mile—figures which give some idea of the nature and extent of the sinking by which it has been produced. The whole of the surrounding district still sinks rapidly, and year by year the water covers more ground.
>
> The land subsides gradually here, but when we go a quarter of a mile to the northeast of the Top of the Brook we come across a subsidence of a still more alarming character. Here the ground sinks in immense masses to a great depth. Some five years ago a tiny brook or ditch, which a child could skip across, passed over flat fields. Gradually the land began to sink and cracks opened in the surface right across the course of the brook. The water went down the crevices.
>
> The land immediately sank more rapidly; huge cracks wide enough for a man to slip into formed, and very soon a district extending fully 1,000 ft. in length by as many in breadth sank rapidly to a depth of 40 to 50 ft. in the center and was filled up to a certain height with water which covered the hedges and trees. . . . A row of cottages in the neighborhood has recently been taken down, the cracks reaching and running through the midst of them.

Since 1882 this condition has been getting worse. Parliament was asked to make the brine pumpers provide a compensation fund for the damage they were doing. Not until 1891 was the act passed. Under it they were compelled to pay a tax on production which was not to exceed 6c. per thousand imperial gallons of brine pumped—about 5c. per thousand gallons in our way of reckoning.

Two districts were formed and the compensation was collected so as to provide the necessary aid in each district. By putting Winsford and Northwich together, the latter town drew a large appropriation, owing to its greater damage, and yet did not levy any heavier tax than was levied in Winsford, to the great disgust of that village. It is likely that if any such contribution is levied on account of subsidences in the anthracite region the districting feature will occasion much trouble, for if output is taxed and the areas grouped are small, the part which is already most completely undermined and most dangerous will undoubtedly have the least generous income.

If each area is placed by itself, the section already undermined thoroughly might be taxed so heavily as to make the owners unwilling to retain property rights that involved such oppressive redemptory charges. Thus the land holders would suffer damage without compensation. On the other hand, the operators who are doing little or no damage would much resent paying for the evil effects of other enterprises with which they have nothing in common.

Is the Shortage of Anthracite Coal a Myth?

In the face of the fact that domestic sizes are higher in price than in previous years, the early demand is undoubtedly greater. The apparent explanation is that the people seem to have more money and are buying more freely, seeming to have made up their minds that they are at least going to indulge in the luxury of plenty of fuel this winter. If this is a fact, and the increased number of families who are buying their supplies in advance seems to prove the contention, there is the possibility of a reaction, unless the winter is unusually severe and stocks are used up early. We are inclined to the opinion that the persistent talk of a shortage in the production is forcing sales now and that by the middle of November, weather being normal, there will be a lull and an opportunity to restock.

Despite the scarcity of labor in the mining regions the apparent shortage might be due to the exceptional efforts made in New England and the West to secure ample supplies before bad weather sets in. There are rumors of all kinds of premiums being offered, sometimes as much as $1 to $1.25 in advance of the circular for stove and chestnut coal. From the West, too, comes the story that pea coal, a size but rarely used in that market, is being anxiously sought at prices 50c. to 75c. above the Eastern circular.

The retail men continue to point out these rumors as supporting their theory of a shortage and while it is difficult to verify these stories, it seems certain that the big companies at least are not asking anything above circular. It is not unlikely, however, that the individual shippers are neglecting the Eastern markets to take advantage of the better prices offered elsewhere.

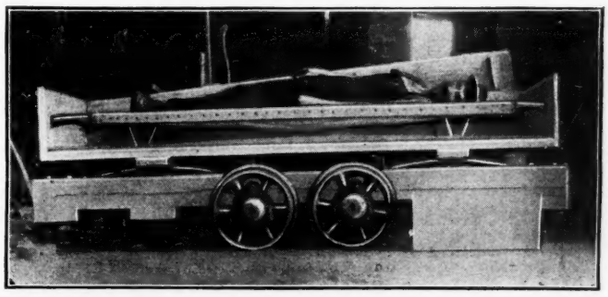
Department of Human Interest

Underground Mine Rescue Car

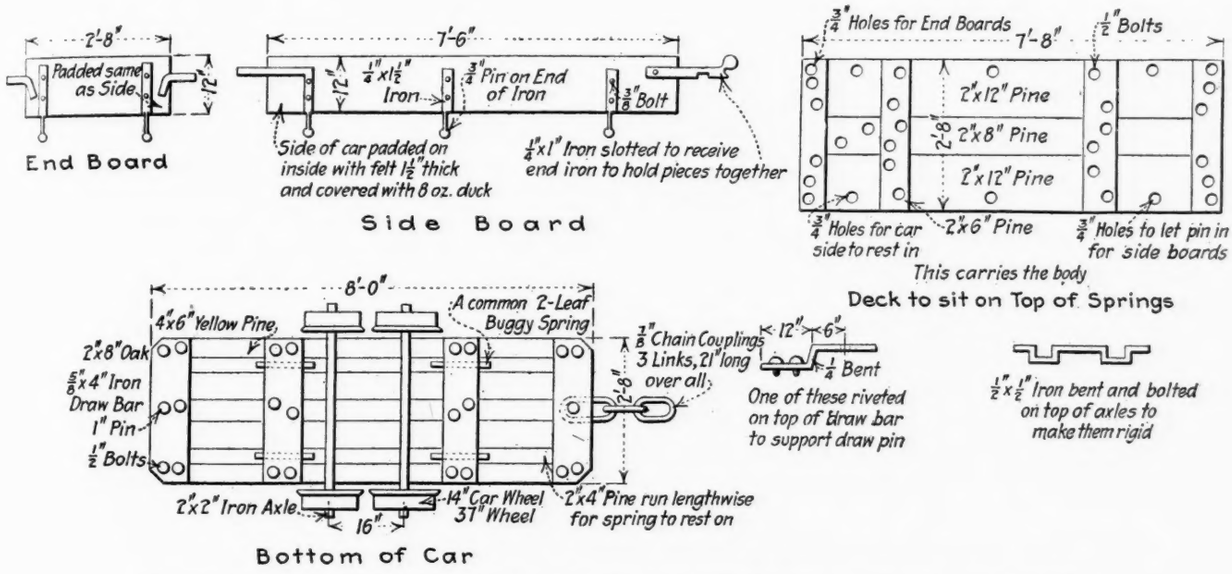
By Gaston Libiez*

The Illinois Zinc Co. has done much to provide for the comfort of its employees. One of the latest improvements designed by J. A. Ede, the consulting mining engineer of the company, is a stretcher car by which injured men may be brought in comfort and without jolting to the surface. The design is quite simple—a skeleton mine truck supporting carriage springs to which a box, in which the stretcher is placed, is secured.

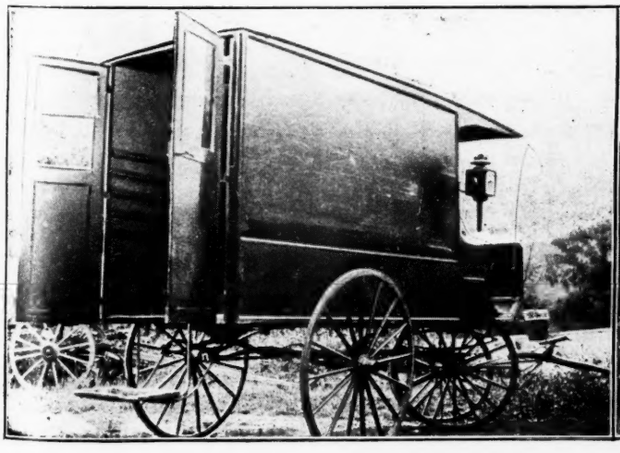
*915 Bluff St., Peru, Ill.



J. A. EDE'S STRETCHER CAR FOR HIS INJURED COAL-MINE EMPLOYEES


2'-8"
Padded same as Side
12"
End Board
7'-6"
12"
1/4"x1 1/2" Iron
3/4" Pin on End of Iron
3/8" Bolt
Side of car padded on inside with felt 1 1/2" thick and covered with 8 oz. duck
1/4"x1" Iron slotted to receive end iron to hold pieces together
Side Board
3/4" Holes for End Boards
7'-8"
1/2" Bolts
2"x12" Pine
2'-8"
2"x8" Pine
2"x12" Pine
3/4" Holes for car side to rest in
2"x6" Pine
3/4" Holes to let pin in for side boards
This carries the body
Deck to sit on Top of Springs
8'-0"
4"x6" Yellow Pine,
A common 2-Leaf Buggy Spring
2"x8" Oak
5/8"x4" Iron Draw Bar
1" Pin
1/2" Bolts
1/8" Chain Couplings 3 Links, 21" long over all
2'-8"
12"
6"
1/4" Bent
One of these riveted on top of draw bar to support draw pin
1/2"x1/2" Iron bent and bolted on top of axles to make them rigid
2"x2" Iron Axle
16"
14" Car Wheel
37" Wheel
2"x4" Pine run lengthwise for spring to rest on
Bottom of Car

DETAIL OF SIDE BOARD, END BOARD, BOTTOM AND STRETCHER-DECK BOTTOM OF CAR



ILLINOIS ZINC CO.'S MINE AMBULANCE

FIRST-AID CORPS AT ZINC COMPANY'S COAL MINE

The first car of this type was constructed at the Deer Park mine, southeast of La Salle. Another car will be built at Peru and used at the mines at that place. A box is slung from the truck portion of the car. In this will be kept bandages, salves and stimulants and a lungmotor. The car will be kept in a dry place specially provided for the purpose. This place will be at some point near the face of the workings.

The cost of the car, including all labor and material was $80; the length over all is 8 ft., the width 2 ft. 8 in., and the height of the box 12 in. The bill of material is as follows:

Lumber:

2 pieces 4x6 in. by 8 ft. long, yellow pine.
2 pieces 2x12 in. by 7 ft. 8 in. long, yellow pine.
1 piece 2x10 in. by 7 ft. 8 in. long, yellow pine.
4 pieces 2x6 in. by 2 ft. 8 in. long, yellow pine.
4 pieces 2x8 in. by 2 ft. 8 in. long, oak.
2 pieces 2x4 in. by 8 ft. long, yellow pine.
4 pieces 1x12 in. by 7 ft. 8 in. long, yellow pine.
2 pieces 1x12 in. by 2 ft. 8 in. long, yellow pine.
1 piece 1x10 in. by 7 ft. 8 in. long, yellow pine.

Iron and Bolts:

60 ⅜x1¾-in. carriage bolts.
40 ½x4½-in. carriage bolts.
35 ½x9-in. carriage bolts.
20 ½x3-in. carriage bolts.
10 ⅜x3-in. carriage bolts.
1 piece ⅝x4-in. iron 8 ft. long.
2 pieces ⅝x4-in. iron 20 ft. long.
10 pieces ¼x1½-in. iron 14 ft. long.
2 pieces ½x2-in. iron 30 ft. long.
5 ⅜-in. cut washers.
10 ½-in. cut washers.
1 ⅞-in. chain in three links, 21 in. long.
1 1-in. pin, 8 in. long, with 12 in. of ¼-in. chain attached, to go with car to couple with 4 common two-leaf buggy springs made out of ¼x1½-in. spring steel; length over all, 3 ft.; distance between springs = 8 in.
1 set of 14-in. diameter car wheels.
2 2-in. standard axles, 3 ft. 1 in. gage.

Province Rewards First-Aid

The British Columbia Department of Mines has provided four handsome silver cups for annual competitions in first-aid work by teams of miners, one each for the four districts in that province, namely, (1) Vancouver Island and the coast, (2) Nicola and Similkameen, (3) Boundary and West Kootenay and (4) East Kootenay. For the present, competitions in three of these districts are likely to be restricted to coal miners, since few if any first-aid teams have yet been organized in them by metal miners. In the other district, that of Boundary and West Kootenay, there are no coal miners, but there are teams of metal miners.

TYPE OF CUP THAT IS BEING PRESENTED BY THE PROVINCE OF BRITISH COLUMBIA

The rules under which the competitions for these cups are conducted have been formulated by Thomas Graham, chief inspector of mines for the department, as follows:

1. Competitions for the cups shall be open to all mining employees in and about the coal and metalliferous mines of British Columbia. Should there be no competition for the cup in any district for two years in succession, the Department of Mines reserves the right to remove the cup from that district and place it for competition in some other district.

2. The cup shall be open for annual competition, at a place to be designated by the district committee.

3. Competitions for the cup shall be in a team event consisting of not less than five persons, including a patient.

4. Every member of a team contesting, including the patient, shall be the holder of a first-aid certificate of competency from the St. John Ambulance Association, and may be either a surface or an underground employee. No physician nor professional nurse shall be eligible to compete.

5. No official of the British Columbia Department of Mines shall be eligible to act as a judge in any competition for a cup.

6. The method of discounting in any competition shall be the standard adopted by the Department of Mines. Discount cards will be provided.

Two Kinds of Bosses--Which?

One boss greets his men in the morning in a very gruff manner, reminding them that they are at least five minutes late and urging them to hurry up and get something done. He gives them what he thinks is a full day's work, and if they are more speedy and finish the job earlier than he thought they could, expecting a word of commendation from him, they are scolded for not going to some other place to begin another job, though if they did, they really wouldn't have time to work after they reached the place where the work was to be done.

On occasions when he goes out with them, instead of working as one of them, he fumes and fusses when they do not do the work with as much ease and accuracy as he would; and naturally enough, for they really can't work while he is around.

On Saturdays, when they expect a half holiday—as it is the rule of the company—he invariably finds them enough work to keep them busy the greater portion of the day, and many a time they have to work on Sunday also.

When the national holidays come, which everyone is supposed to celebrate, the time is granted so begrudgingly that his men cannot enjoy it. If they make a mistake, as all men occasionally do, they receive a veritable "cussing out."

Nor are they allowed to make any suggestions about the work, because they are not thought capable of improving on the boss' inspired provisions. In fact he's boss, they are his subordinates.

Another boss—and he's been successful with his men—greets them in not only a courteous but a friendly manner in the mornings. If they are late, he merely reminds them of the fact, and rarely are they without a legitimate excuse. Besides they are not often late.

He gives them a day's work to do, and if they labor with exemplary diligence and finish it a half-hour earlier, he gives them that half-hour as compensation for their good work. When he works with them, he's one of them—offering suggestions and receiving them; and in most cases they are worthy of adoption and save expense.

He argues this way—that the men being over the ground more frequently than he, have found some short-cuts or an easier, more efficient way of doing things—why not use their methods? It will help him and them. And if a man puts enough thought into his work to get something out of it, he's developed himself that much and is that nearer ready for the job higher up. Then, if one suggestion is received favorably, he'll try hard to find another. He will feel that he is a part of the job, and if the work is to be more efficiently done, he must be a part of the efficiency.

The holidays of this boss' employees are provided for. He says that men, like children, must have something to look forward to besides their "bread and butter." One man suggests that the fact that they will some day attain the job higher up ought to be incentive enough, but it's an old man, I fear, who can work contentedly without some spice along the road.

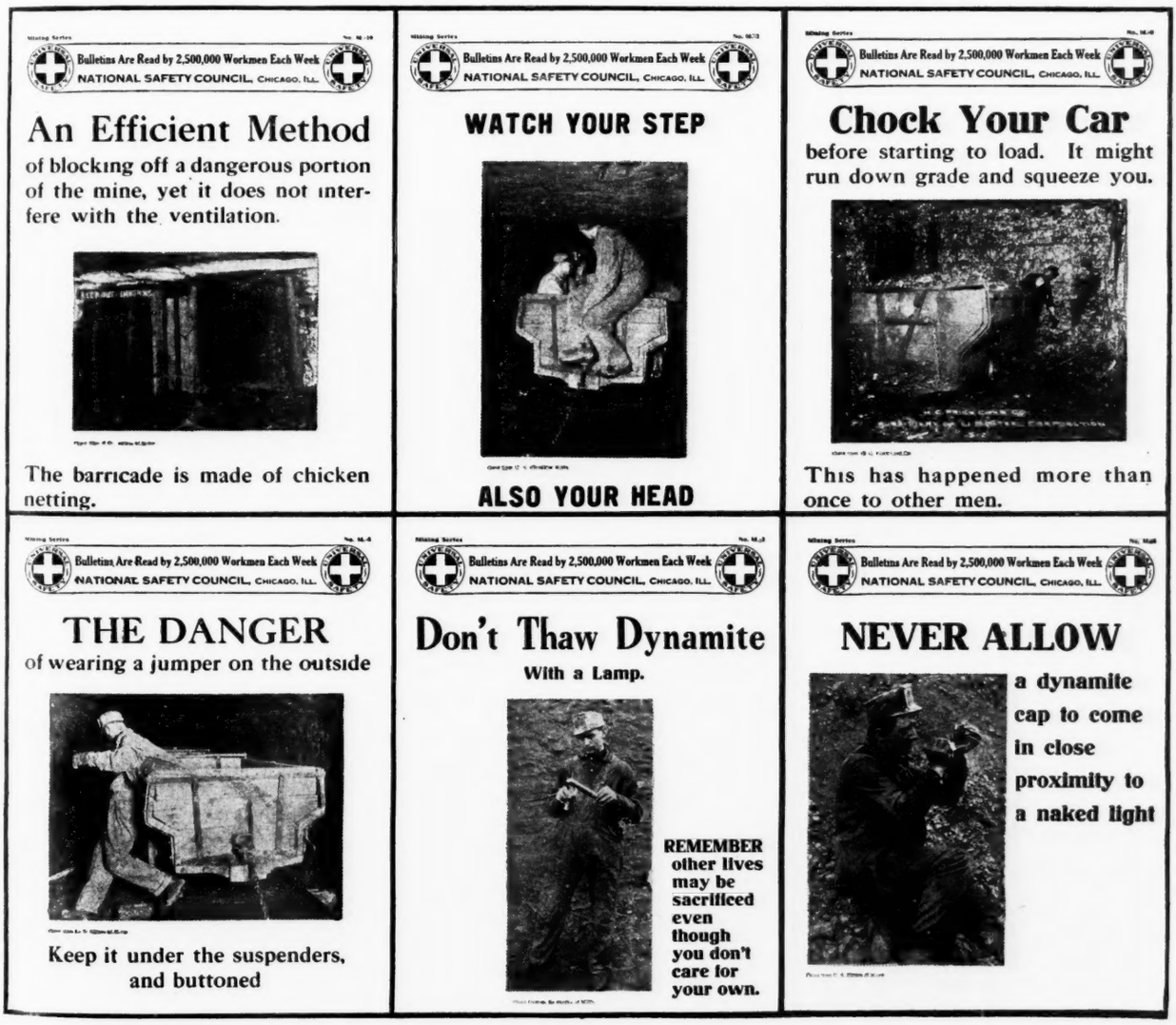
Then, too, what's the man going to do when, just as he's served his allotted time and is ready for promotion, a financial depression comes and the salary of everyone is reduced? He needs must go on in the same rut indefinitely. Isn't that enough to take some of his ambition away and leave him almost spiritless?

This boss, too, says that he finds the boys work better after a holiday. It seems to freshen them up, and if any thing has gone wrong or anything unpleasant has happened, it serves as a panacea for those ills.

He doesn't give them certain work to do or have one man for one job. He lets them do different parts of the work, so when promotion time comes, they are not altogether ignorant of their new work. In fact, he and his men are good friends and they labor hand in hand for their job and each other.

Of the two kinds of bosses, which one would you have for yours?

The Jamison Coal and Coke Co. Held a First-Aid Meet at Crabtree, Westmoreland County, Pennsylvania, on Aug. 9, in which 11 teams, representing many plants of the company, participated. Team No. 4, of Forbes Road, with an average of 97.75, took first place and received the silver cup, which must be held three years before it becomes the property of the winner. Team No. 8, of Jamison No. 2, took second place with an average of 96.25. Team No. 1, of Luxor, was third, receiving 95.75 points. About 2,000 persons were present.


Bulletins Are Read by 2,500,000 Workmen Each Week
NATIONAL SAFETY COUNCIL, CHICAGO, ILL.
An Efficient Method
of blocking off a dangerous portion of the mine, yet it does not interfere with the ventilation.
The barricade is made of chicken netting.
WATCH YOUR STEP
ALSO YOUR HEAD
Chock Your Car
before starting to load. It might run down grade and squeeze you.
This has happened more than once to other men.
THE DANGER
of wearing a jumper on the outside
Keep it under the suspenders, and buttoned
Don't Thaw Dynamite
With a Lamp.
REMEMBER other lives may be sacrificed even though you don't care for your own.
NEVER ALLOW
a dynamite cap to come in close proximity to a naked light

SOME OF THE WEEKLY BULLETINS ISSUED BY THE NATIONAL SAFETY COUNCIL IN ITS NEW MINING SERIES

Discussion by Readers

Springs on Mine Locomotives

Letter No. 3—In regard to the question of whether a locomotive having no springs can haul more than one mounted on springs, as suggested in the inquiry of "Motorman," *Coal Age*, Sept. 9, p. 441, there seems to be no reasonable ground to attribute the greater tractive power of the springless locomotive to that feature of its construction, and I disagree with his contention that the observed difference of tractive power is due to the springs.

In the first place the construction of these locomotives is quite different. In order to make a fair test of the effect of mounting a machine on springs it would be necessary to compare two machines of equal weight and like equipment. The purpose of mounting a locomotive on springs is to distribute the weight equally on all four wheels, which, as *Coal Age* has already stated, increases the tractive power of the machine.

In my opinion the difference in this case is due to some other cause. For example, there may be a difference in the equipment of these machines. It happens at times that a 6-ton locomotive may have an armature suitable for a 9-ton machine, which would give the lighter locomotive when so equipped the advantage of a heavier one equipped with an armature adapted to its weight.

It must be assumed that these machines all take their power from the same trolley system; but even then one machine may have a greater internal resistance than another, which would reduce its effective power and its possible tractive effort. Again, there is a great difference in motormen. Some motormen are able to get the last pound of strength out of a motor and haul heavier trips than others, who in attempting to pull the same load will stall their machine on the grade. I have noticed this frequently in my experience in mining.

I recall one instance where two General Electric locomotives, both mounted on springs and of equal weight and equipment, were operating on the same run. Yet one of these machines would always haul a heavier load than the other. We never thought it strange, but imagined the difference was due to a greater frictional resistance in the machine. I believe such differences are of common occurrence. I shall watch this discussion with interest, as there may be other reasons for the difference which I shall be glad to learn.

E. E. F.

Spangler, Penn.

Letter No. 4—My attention has been drawn to an inquiry on this subject by "Motorman," *Coal Age*, Sept. 9, p. 441. The information given in this inquiry is meager and hardly sufficient to enable one to make a satisfactory reply.

However, I will state that it has frequently been found in practice that a locomotive will weight 20 per cent. of its full tonnage on either side. This fact alone may cause one locomotive to outpull another of the same rated weight but having a different balance, which makes the tractive power of the two machines quite different.

The writer of the inquiry assumes that the greater tractive effort of the 6-ton, single-type Goodman machine, over the 6-ton, General Electric double-type locomotive is owing to the fact that the former has no springs, while the latter is spring-mounted. Permit me to say that if these two machines are of equal weight and balance, the greater tractive power of the Goodman locomotive is because its four wheels are all tied together and driven by one motor, while in the General Electric machine each pair of wheels is operated independently by a separate motor.

In the former case one pair of wheels cannot slip without the other pair doing the same. This feature of a single-type locomotive gives the machine a greater tractive power and enables it to pull a heavier load than a double-type machine. I will add that if the 6-ton Goodman having no springs were equipped with two motors, each operating a separate pair of wheels, it would probably not pull as many cars as the General Electric machine mounted on springs, since the spring-mounting tends to equalize the load on four wheels and increase its tractive power.

In considering the greater tractive power of one machine over another there are many things to be taken into account, from an operating standpoint. As far as springs are concerned, it may be stated that their purpose is to relieve both the road bed and the equipment from the severe shocks caused by the wheels running over bad joints and uneven tracks. Since it is practically impossible to build and maintain a perfectly even track, it has been found best to mount both the locomotive body and the motors on springs that absorb the shocks caused by running the machine.

It is always found in practice that the operation of a locomotive without spring suspension greatly increases the cost of track maintenance and locomotive repairs. This statement is borne out by the fact that all the larger mining companies have, or are discarding, locomotives without springs and installing machines in which not only the frame is spring-mounted, but also the motors.

GRAHAM BRIGHT, Mining Engineer,
Westinghouse Electric and Manufacturing Co.
East Pittsburgh, Penn.

Gathering-Motor Haulage

Letter No. 4—The question of gathering haul is one of unusual interest in most mines, and the exchange of ideas on this subject together with the suggestions offered will prove of great practical help to mining men who contemplate the use of gathering locomotives, or who may desire to improve their present system of hauling.

In the first place it must not be taken for granted that locomotive haulage is the most efficient or most economical system that can be used and that it is adapted to all conditions. Its lack of adaptation to conditions is most frequently manifest in the gathering haul by which the coal is brought from the working face to the inside parting where trips are made up to be hauled out of the

mine. When the output is comparatively small, and the mine cars not too large or the grades too great, I believe that mule gathering is not only more economical but more efficient than motor haulage. This opinion has been strengthened by the experience of other men who are well qualified to judge.

On the other hand the modern mine with a large output of coal can well employ other equipment. Mine cars of from 3 to 5 tons' capacity are used to lessen the cost of transporting the coal from the working face to the shaft bottom and to decrease the number of hoists necessary for the same tonnage. Mules are here out of the question and locomotive gathering is ideal, as a 5-ton load is handled by a motor as easily as a single ton is handled by a mule. The entire operation is systematized, and motormen and trip-drivers become surprisingly efficient.

A Successful Gathering Haul

The system of gathering haulage employed at mine No. 1 of the Oliphant-Johnson Coal Co., in Knox County, Ind., which may be of interest, is as follows: The mine is worked on the panel system, a pair of entries being driven up the center of each panel and 20 rooms turned off each entry, making 40 rooms in all in a panel. The entries are driven 12 ft. wide and the rooms, which are 250 ft. deep, are turned or necked the same width for a distance of two cuts and then widened on an angle of 45 deg. on the inby side to a width of 30 ft.

In this state the miners' and operators' agreement requires three working places for two men, except where the coal averages more than 6 ft. in thickness; but when rooms 30 ft. or more in width are worked as double rooms, with two tracks in each room, the agreement provides but two such places for two men, which is the system employed in the mine I am describing.

Entry tracks are laid with 30-lb. rails, while 20-lb. iron is used in the rooms. The turnout at each room has a 13½-ft. lead with a No. 2 frog and 4-ft. switch points joined together by a single bridle-bar, but having no throw-switch. The switch points are moved by means of a hook carried by the triprider for this purpose. The locomotives are 5-ton, single-end control, operating on 250 volts and equipped with a reel containing 500 ft. of duplex cable.

"Crabbing" Cars Where Locomotive Cannot Enter

When a locomotive enters a room or proceeds up an entry beyond the point reached by the trolley wire, the duplex cable is hooked to the trolley wire and to the rail. As the locomotive advances, the cable pays off the reel and winds up again on the return trip. For the purpose of hauling cars out of places where it is impracticable for the locomotive to enter, the latter is equipped with a winding drum, or "crab," holding 450 ft. of ⅜-in. wire cable. This drum is driven by an independent 7½-hp. motor. This provision greatly extends the range of operation of the locomotive.

In "crabbing" a car from an inaccessible place it is of course necessary for the tripdriver to pull the cable in to the place and hook it to the car, while the locomotive stands at the entrance. As the crab is operated and the car hauled to within a short distance of the locomotive, the winding motor is stopped and the locomotive started ahead, pulling the car behind it onto the straight track, where the cable is unhooked and the car coupled to the locomotive. In crabbing a car, the rope speed at this mine was 350 ft. per min. In order to control the speed of the car in crabbing and prevent its doubling on the rope it may be necessary to sprag the car wheels when the grade favors the load.

It is more satisfactory to run the locomotive into the rooms, by using the duplex cable whenever this is practicable, and this method is generally employed in preference to crabbing. Trouble is sometimes experienced when the duplex cable becomes worn and the insulation of the two wires is imperfect. In that case the current short-circuits and blows out the cable. The use of friction tape, which is hardly an insulating material, but is frequently employed to make hasty repairs in a duplex cable, gives only temporary relief. The duplex cable at this mine is being replaced with single cable, the return current following the rail, which is fishplated but not bonded in the rooms. By this means, better success is attained than in the use of the duplex cable.

In the operation of gathering a loaded trip the locomotive pushes an empty trip up the entry, distributing the cars in the same manner as described by R. Z. Virgin, *Coal Age*, Aug. 26, p. 361. The mine cars used here are of 3½-ton capacity, the empty car weighing about a ton. A 5-ton locomotive will haul a trip of 15 loaded cars on a level track, or from six to eight cars against a heavy grade. Each locomotive gathers from 80 to 125 cars per shift of 8 hr., but this performance will vary greatly with the grade, length of haul and condition of track.

W. E. Buss,
Vincennes, Ind. Engineer of Mines.

Safety in Blasting

Letter No. 3—There is one danger in the employment of a shotfirer whose duty it is to shoot all holes in the mine at night when the men are not at work in their places; that is, the shotfirer may work from 7 p.m. until 4 a.m., firing shots in different sections of the mine, and the places stand idle till the men come to work the next morning.

Let us suppose that the first shot is fired, say at 7:30 p.m., and that the place stands idle and vacant until the miner arrives at 6 or 7 o'clock in the morning. The shot may have knocked out some of the timbers and left loose slate hanging unsupported during the night, and the miner finds the place working badly and very dangerous. Under these conditions, it is not strange if a fatal accident occurs, which must be recorded.

Again, in another place, the machine may have cut through into the gob, or nearly so, and when the shotfirer performs his work there, unless he is a very careful man who is acquainted with the existing conditions, and makes a close examination to ascertain the probable effect of the shot, there is liable to result another danger from a loose end standing unsupported a considerable length of time until the miner arrives.

Let me suggest that these dangers are particularly imminent when shotfirers are employed who are not thoroughly acquainted with every condition in the mine. In rib workings it would often be better to employ a practical rib boss to take charge of the shooting in that section. Such a man would be well acquainted with every condition and use his judgment in firing all shots. He would not

permit the place to stand a considerable length of time without needed support after a shot was fired. Where a place is cut through and a shot is liable to cause a fall he will probably not fire the shot until the men arrive in the morning, so that there will be no danger of their running into a dangerous place when starting to work.

Leckrone, Penn. A. M.

First-Aid and Mine Safety

Letter No. 3—One of the first requisites in safe mining is a well trained first-aid team. The work they do in case a man is hurt in the mine will often save the life of an injured comrade and thus prevent a fatal accident being recorded.

In my opinion it behooves every coal operator in Pennsylvania employing five or more men to be interested in first-aid work and have men that can render this service intelligently in time of need. The organization of a first-aid team is important not only from a human standpoint, but also for financial reasons. The mine is made safer and the fatal accident rate reduced. Insurance against liability for accidents, under the Workmen's Compensation Act, can be obtained at a less cost in a mine so equipped and organized.

First-aid work is very important in a mine equipped with electricity, because of the danger of contact with live wires. Where a man without first-aid training would stand transfixed and helpless in case of an accident causing a severe injury, the well trained first-aider knows at once the best thing to do and, perhaps, saves the life that would otherwise ebb away while waiting for the doctor or an ambulance to take the injured one to a hospital.

First-aid service that is badly performed is worse than none at all. A bungling first-aider will often increase an injury by the careless handling of a broken limb, or by applying a dirty bandage to a wound, thereby causing infection. In a mine where I was employed as assistant foreman, there was a Johnson first-aid cabinet in every assistant's shanty, but, in most every case when an accident occurred and bandages or other supplies were needed, the cabinet was found to be nearly empty, and the things that were wanted were not there. In my opinion, that mine would have been better off without the first-aid work, which was often poorly done. Every first-aid cabinet should be kept well supplied with good clean bandages, long and short splints, and other customary supplies.

First-aid teams should meet at least once a week in a hall provided for that purpose, and on such occasions instructions should be given in every detail of the work. As far as possible, every man employed in and about the mine should be induced to attend and receive the needed instruction and training in this work. No one should begrudge an hour or two a week spent in this way, as the information gained and the training may prove invaluable at home or in the mine. This is particularly true of the married man who has a family, as no one knows at what time the little tots so dear to every working man may be injured, and the first-aid training received may be the means of saving their lives. I hope to see the day when the Pennsylvania mining laws will require that every mine employing five or more men shall provide first-aid training for its employees.

Madera, Penn. SAMUEL JONES.

Service and Wages

Letter No. 1—In the first paragraph of the foreword treating on the "Management of Men," *Coal Age*, July 1, 1916, two striking statements appeared. The first statement is "Wages must be paid only for value received"; and the second, "A scant wage buys scant service."

The article was full of interest, but I am compelled to conclude that if the policy embodied in these two statements was to be adopted and fully carried out in the management of coal-mining affairs, there would have to be a considerable readjustment, not only of the wages paid to the men but likewise of the salaries paid to the officials. On the whole, I believe there would be about as many reductions required as advancements made in the payments for service. To make the wages paid always proportionate to the service rendered in every case would be a difficult problem, as it is often hard to determine the dollars-and-cents value of work performed, the difference in the character and value of different grades of work being so great.

The recognized principle of Socialism is, "Equal wage for equal work." The difficulty consists, however, in determining the equality of work performed by different men in the same time. Because of different physical or mental ability and endurance, no two men will work with equal efficiency, and the value of their performance is not the same. Again, the proficiency of two men in a certain line of work may be the same; but, while one does an honest day's work, the other slights his task and accomplishes less in the same time. The industrious man will generally do more than he is asked, while his fellow workman only completes the work laid out for him. One man works cheerfully and inspires all about him with the same spirit, while the chronic grumbler is a hindrance to every man on the job. The man who talks while he works may be a good worker himself, but he will often impede the work of others.

INCIDENT SHOWING THE RELATIVE VALUE OF CAPABILITIES OF MINE WORKERS

Replying to the inquiry of the business man who was visiting the mine, as to what the average miner earns digging coal, a foreman replied that "a miner's earnings depended largely on his desire to make money. Of two miners working in adjoining places, one will load nearly twice the amount of coal loaded by the other, who may be equally as strong but who has not the same incentive for work." Experience and observation show that this is true, and when there is a great demand for coal, the miner who can load the most is the more valuable man. In coal mining, as in all other industries, all men do not acquire the same knowledge or experience, and the work they perform in a day has not the same value. Other things being equal, the more extended a man's experience, the more valuable should be his services. This rule, however, will not always hold true, as the following illustration shows.

Jack was a strong, young man who was put to work under an experienced miner engaged in sinking an inside slope in a mine where I was employed some years ago. Bill, another assistant, was a man who had worked long in the mines and could do almost anything required of him, on which account he was paid more wages than Jack, though the latter was stronger and did more work, for he

was a ready man. When Jack complained to the boss, telling him that he should receive the same pay as Bill, he was told that while it was true he could do more work where he was than Bill, yet the latter could be sent to any part of the mine when needed to drive a mule, build a brattice, repair track, or timber a place. The boss explained that, for this reason, Bill was worth more to him than Jack. The result was that Jack saw the point and applied himself with vigor to his work and was soon able to draw better pay than Bill.

EFFECT OF INCREASED WAGES ON SERVICE RENDERED

Now, referring to the second statement, that "a scant wage buys a scant service," my experience is that there is a large class of indolent, thriftless miners, who work no better or steadier for higher than they do for lower wages. I believe an increase in pay cuts but a small figure in respect to the service rendered by the better class of miners. To illustrate: Several years ago I was foreman of a certain mine during a dull season in the coal business. The wages paid the men were exceedingly small and work was scarce, so that the men were fairly well contented, believing that the company was doing as well as could be expected. A little later the coal business suddenly improved and there followed, in quick succession, three increases of wages. I remember, however, that the men worked no harder or steadier after the last advance in pay was given them than at any time during the depression.

I do not want to be understood as advocating the payment of small wages as a means of obtaining better work from the men; but I claim that experience proves that high wages do not make better or more efficient workers, or make men more loyal and contented in the performance of their daily tasks. I believe that all men should be paid reasonable wages and that they, in return, should give reasonable service. The honest employee, when working for $3 a day, will do no more or better work if paid $4 a day, neither will high wages make dishonest workmen reliable and honest.

Loyalty, confidence and prejudice make the business and interest of men common, and these qualities cannot be purchased or valued in dollars and cents. To develop these qualities in their men, mine mangements must get closer to the workers and understand better their qualities, capabilities and individual capacities. By this means a coöperative spirit is cultivated to such an extent that interests become mutual and employees will be inclined to render full service for the pay they receive. The employer who has the respect, friendship and confidence of his men is the one who receives their best service whether wages be high or low. This rule is of general application in coal mining. JOHN ROSE,

Dayton, Tenn. Former District Mine Inspector.

An Efficient Coal Miner

Letter No. 6—It is hard to understand why the miners of the present time say they cannot make money. The average miner, for example, makes as much money as the skilled laborer. The man who understands how to dig coal makes big money right from the start. Compare him with the man who starts to learn a trade. The latter has a hard row to hoe to begin with, because for the first three years he can only average from $40 to $50 a month.

The trouble with the average miner today is that he wants to be equal to the mine foreman or the superintendent in respect to salary. Before becoming dissatisfied, however, a miner should ask himself, What other work can a man do who has worked in a coal mine for at least 30 years of his life? He is no good for any other kind of work, and if he has not a good home or a good substantial bank account, after spending 30 years digging coal, it is his own fault.

I believe that the coal companies and corporations of West Virginia have treated their miners squarely. We must remember that in the year 1914 when the bottom was knocked out of the coal business, many of the mines worked and did not make a cent of profit on their coal. They did this simply to keep their men from starving. Now when the coal business is good and the companies have given their men an increase, it seems that they are still dissatisfied, which reminds one of the saying, "Give some people an inch and they will take a mile." If the coal companies of West Virginia should shut down their plants when business is slack, the men would know better then how to appreciate prosperity when it comes.

Mt. Clare, W. Va. C. T. GRIMM.

Waste of Material in Mines

Letter No. 9—It is no more impracticable to avoid waste of material in coal mines than it is to do the same in machine shops or factories. This being true, we may well inquire, How is it that the waste of material, which is so common in coal mining, is practically an unknown feature in shops and factories, where every scrap of material is carefully saved and utilized for some purpose? I believe that the answer to this question is to be found in the fact that a shop or a factory is adequately supervised and its operations are exposed to the broad light of day, which is quite the reverse of the conditions existing in most mines.

In the majority of cases too much is expected of a mine foreman. Unable to give the same degree of attention to every detail of the work in his charge, this official is compelled to let much that needs attention wait until another time. From day to day he postpones the gathering of props and ties that have been left in abandoned places and a few rails thrown aside on the edge of some pillar working. He knows well that all these should be cared for and removed to a place where they can be used again. Also, he intends some idle day to pull out an old pipe line now no longer used and lying in a ditch covered with acid mine water.

THE MINE FOREMAN'S "IDLE DAY"

When the idle day finally comes, and the foreman decides to devote the time to recovering this waste material, he finds the props and ties rotten, while the rails are covered by heavy falls and the pipe so badly eaten that it cannot be used again. There is no excuse for a busy foreman, however, permitting his trackmen to carry their spikes, bolts and nuts in an old feed sack that scatters its contents along the road, when a few moments of the carpenter's time will provide a light, handy box for the purpose and prevent the loss that otherwise must occur.

In many instances the superintendent is largely to blame for a mine foreman's lack of attention to little details that would minimize the waste of material in the

mine. When a superintendent is too busy to go into the mine at regular periods and inspect the work being done, the mine foreman will generally be found less careful and attentive to little details that he knows only too well are important. The best foreman in the world will take less interest and pride in his work when he knows that the superintendent is not interested enough underground to inspect the mine from time to time.

How can a mine superintendent know when his foreman has more on his hands that requires attention than one man can well look after, unless he goes into the mine at least once a week and acquaints himself with the work? A competent superintendent will quickly discover on his trips of inspection when his mine foreman is overworked. He will often find that it is a physical impossibility for the foreman to give the question of waste of material the attention that it deserves, and will give this matter in charge of another person, whose duty it will be to gather up all waste material in every part of the mine and store it where it will be available for use as needed. A company that would object to a man devoting his time to this purpose will have no reason to blame a mine foreman when the expense for supplies is unusually high.

Pernicious System of Frequently Changing Mine Foremen and Its Effects

There are many mines in this country where the custom of changing foremen is chronic. In such mines it will generally be found that there is a great waste of material. Where the workings are extensive, a new foreman cannot be expected to know at once in what abandoned places he can find the material he needs; and, the demand being urgent, he makes requisition for what is wanted, insisting that these supplies be obtained without delay. It may be suggested that the superintendent should inform a new foreman where much of this material can be found in the mine, which is true and shows clearly that every superintendent should be fully acquainted with his mine and know what it contains. However, the mines that change their mine foremen frequently will seldom be found to keep the superintendent long enough to permit him to know all the working places in the mine, much less the abandoned portions where most of the wasted material is to be found.

Instances have come under my notice, and they are not rare by any means, where mine superintendents and foremen have explained their failure to be acquainted with abandoned portions of the mines in their charge by pointing to the mine map where such places were marked plainly "worked out." They claim, properly, that one would not expect to find material of any value in areas where everything of use should have been withdrawn when the place was closed. However, permit me to say in closing that a superintendent or foreman who will hold his position longer than a few days will not be limited in his investigations in the mine by what is marked on the mine map. He will soon know whether the map can be taken at its face value or must be discounted. Unfortunately, there are too many incomplete and misleading mine maps. The claim is true, nevertheless, that everything of a serviceable nature should be withdrawn and put where it can be utilized again whenever a section of the mine or a working place is abandoned.

Charleston, W. Va. F. C. Cornet.

Detecting Gas by Smell

Letter No. 19—It appears strange to me that many of the writers on this subject seem to sidestep the smell of gas in the mines as an ethereal mystery. I was particularly amused in reading of the man who tested his partner's smelling powers with an open light, as described in Letter No. 12, July 8, p. 83. I agree with the statement in Letter No. 16, Aug. 5, p. 240, that "the gas has the same smell in all mines."

There seems to be a disposition on the part of those who have not detected gas in mines, by smell, to believe that those who have done so possess a sixth sense. In other words, they seem to accept our statements with a grain of salt. In regard to the smell of gas in mines, my experience is that it has the same smell in the mines of South Wales as in the anthracite district or the central coal field of this country. It is an acrid smell somewhat similar to that of artificial gas but not nearly so strong.

The odor of gas in mines can only be detected where sharp gas has accumulated in a cavity in the roof or is issuing as a blower from a crevice in the coal. It cannot be detected by smell after the gas has mixed with air and become diffused in the air current. The following incident will illustrate my contention in this regard:

In a certain mine in South Wales where I was employed timbering an airway, there was a heavy blower of gas at the third working place from the intake aircourse. There were as many as a dozen blowers at different points along this split, and it was possible to get a cap on the lamp from ½ to ⅝ in. high anywhere in the split, from the point of the first blower to where the air entered the airshaft. In this split where so much gas was given off, its presence could not be detected by smell at any point, except close to one of the blowers. All the blowers were strong enough to deflect the flame of a safety lamp held so that the gas impinged directly against the gauze.

I have never been able to understand how it happened that the same height of flame cap was obtained anywhere along the airway. The only explanation I can give for this fact is that the quantity of blackdamp increased in this split about in the same proportion as the gas. We learn that blackdamp, being composed of extinctive gases, always exerts a depressive influence on the flame cap due to inflammable gas. Assuming that the blackdamp increased, in this split, at the same rate as the gas coming from the blowers, the effect would be to neutralize the tendency to produce a cap, and, the height of flame cap would be practically the same at any point in the airway, as I have observed. If anyone can give a better reason than this, I should be glad to know of his experience and conclusions.

Several have spoken of being overcome by breathing methane. I have never known a person to be overcome in a good current of air. Methane is not a poisonous gas and suffocates only by excluding the oxygen of the air from the lungs. When we consider the large percentage of methane (66.5 per cent.) that is fatal to life, and its rapid diffusion in air, one can only conclude that the ventilation must be very poor in a place where a person is overcome by breathing that gas. It is possible that this effect was due to other gases being mixed with methane, as a very slight percentage of carbon monoxide would cause prostration.

East St. Louis, Ill. W. L. Morgan.

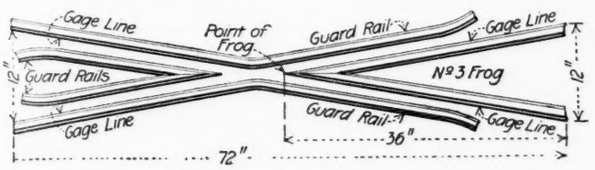
Inquiries of General Interest

Mine Switches and Rail Frogs

I want to ask if you will kindly show the proper proportion of a rail frog, say one that spreads 4 in. in a foot. Also, explain how the lengths of the switch rail and other parts are determined. I am a trackman in our mine and very much in need of this information.

Layland, W. Va. R. E. WOLFE.

A rail frog, which is the kind of frog generally employed in a mine, is made by bolting together sections of rails and riveting these to a heavy iron bedplate. The arrangement of the rails forming the frog and the guard rails is shown in the accompanying figure. Frogs are described by a number indicating the frog angle, or spread, of the rails. This number is the ratio of the length of the frog rails to their spread. Thus, if the rails spread 4 in. in a foot, as suggested in the inquiry, this ratio is 12:4, or 3:1, which is therefore



SHOWING POSITION OF RAILS IN A RAIL FROG

designated as a No. 3 frog. The point of the frog, as indicated in the figure, is the intersection of the gage lines of the two rails.

In the calculation of a mine switch the length of the "lead rail," which is the curved switch rail running from the point of switch in the main track across to the frog in the opposite rail, is first found by multiplying twice the gage (g) of the track, in feet, by the frog number (n). Thus, for a 3½-ft. gage and a No. 3 frog, the length (l) of the lead rail is

$$l = 2gn = 2 \times 3\tfrac{1}{2} \times 3 = 21 \text{ ft.}$$

This length includes the length of the switch latch, which forms a part of the lead rail.

Allowing for a clearance of 2 in. between the latch and the main rail, the length of the latch (x) is found by multiplying the square root of twice the gage (g), in inches, by twice the frog number, which gives

$$x = 2n\sqrt{2g} = 2 \times 3\sqrt{2(3\tfrac{1}{2} \times 12)} = 55 \text{ in.}$$

The latch is pivoted at one end, while the other end that forms the switch point should be beveled so as to fit snugly against the main rail when the switch is thrown. A similar latch is formed in the opposite rail of the main track. These two latches are bound together by a "bridle-bar" which reaches across the track and holds the two latches at a fixed distance apart, so that when one latch hugs the rail the other is about 2 in. from the gage line of the opposite rail.

The length of the bevel on each latch can be found by multiplying the length of the latch in inches by the ratio of the width of the rail tread to that width increased by two. For example, using 25-lb. iron having a tread of 1½ in., this ratio is $1.5 : (1.5 + 2) = 1.5 : 3.5 = 3 : 7$. Then, for a No. 3 frog, the length of the latch being 55 in., the length of bevel is $^3/_7 \times 55 =$ say 23½ in.

When laying a room switch where cars are handled by hand or by mules it is not so important that the latch should conform precisely to the curvature of the rail as determined by the track gage and number of frog used. In such cases the rule is often used that makes the length of the latch, in feet, equal to the frog number or, in this case, 3 ft. Where the mine cars have a capacity of 1½ or 2 tons and especially where motor or rope haulage is used it is better to make all parts of the switch conformable so as to avoid possible derailment of cars.

A simple formula for finding the radius of curvature of the switch rail, when the gage of track and frog number are known, is the following: Multiply twice the gage, in feet, by the square of the frog number. For example, in this case, using a No. 3 frog with a track gage of 3 ft. the radius of curvature (R), in feet, is

$$R = 2gn^2 = 2 \times 3\tfrac{1}{2} \times 3^2 = 63 \text{ ft.}$$

Another rule for finding the radius of curvature of a switch rail is, Multiply the length of the lead rail, in feet, by the frog number. For example, in this case, the length of lead rail being 21 ft., and using a No. 3 frog, the radius of curvature of the switch rail is

$$R = nl = 3 \times 21 = 63 \text{ ft.}$$

Another rule for finding the radius of curvature is, Divide the square of the length of lead rail, in feet, by twice the gage of the track, in feet, which gives

$$R = l^2/2g = 21^2 \div (2 \times 3\tfrac{1}{2}) = 63 \text{ ft.}$$

When desired, the frog angle can be found by one of the following rules: The sine of one-half of the frog angle (a) is equal to the gage of the track, in feet, divided by the length of the lead rail, in feet; or, the length of lead rail, in feet, divided by twice the radius of curvature, in feet; or the reciprocal of twice the frog number. For example, in this case,

$$Sin\ \tfrac{1}{2}a = \frac{g}{l} = \frac{3\frac{1}{2}}{21} = 0.1666$$

Again, $$Sin\ \tfrac{1}{2}a = \frac{l}{2R} = \frac{21}{2 \times 63} = 0.1666$$

Again, $$Sin\ \tfrac{1}{2}a = \frac{1}{2n} = \frac{1}{2 \times 3} = 0.1666$$

The frog angle, as found from each of the above, is $a = 2(9°35') = 19°10'$.

The No. 3 frog, shown in the accompanying figure, is 6 ft., or 72 in., in length, out to out of rails on each side of the frog point, although the real frog is but 3 ft. long, as there indicated. It will be observed that the track rails approaching the point of frog are each bent so as to form the guard-rails of the frog. There is also inserted in the crotch of these two rails a guard made by two short rail lengths bolted together after the manner of a frog. These, however, serve only as guard-rails to guide the wheels as they approach the point of frog.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—(a) Define the term "manometric efficiency" as relating to fans. (b) What is the manometric efficiency of a fan producing 2.7 in. water gage, the blowing-in pressure being 2.4 lb. per sq.ft. and the blowing-out pressure 5.5 lb. per sq.ft.?

Ans.—(a) The term "manometric efficiency" originated with the French engineer, Daniel Murgue, who defined it as the ratio of the effective pressure due to the action of a centrifugal fan to the theoretical pressure, the latter being assumed to be double that due to the height created by the tangential speed of the fan and derived from the formula, $h = u^2/g$, in which h equals head of air column, in feet; u equals tip speed of fan, in feet per second; g equals force of gravity, 32.16 ft. per sec. The term "manometric efficiency" is of no practical value in comparing the pressure created or work performed by different fans, because the pressure a fan will create at a given speed is determined by the resistance of the mine or airway and is not a function of the tip speed of the fan alone.

(b) The effective pressure, in this case, is $2.7 \times 5.2 = 14.04$ lb. per sq.ft. Since the speed of the fan is not given, the theoretical pressure, due to the action of the fan, cannot be calculated by the formula, and it must be assumed that, in this case, it is equal to the sum of the blowing-in, blowing-out and effective pressures, or $2.4 + 5.5 + 14.04 = 21.94$ lb. per sq.ft. On this assumption, the manometric efficiency of the fan is $14.04 \times 100 \div 21.94 =$ say 64 per cent.

Ques.—What are the advantages and disadvantages in the use of the different kinds of mining machines, keeping in view health, safety and economy? Answer fully.

Ans.—The two general types of mining machines in use in coal mining are compressed air and electrical coal cutters. The chief advantage in the use of compressed-air machines is the fact that their operation supplies a certain amount of fresh air at the working face. On the other hand, they possess the disadvantage of requiring a more or less inflexible pipe system that costs more to install and maintain and is not so convenient as an electric wiring system.

The operation of electric coal cutters permits a more flexible system of supplying the power to the machines, since the wires conducting the current are easily and quickly changed to suit the conditions of mining. There is also, in general, a less loss of power in transmission, and the electric current can be utilized for lighting the mine. The surface plant of an electrical installation will occupy less space than that required for a compressed-air installation of the same power.

The disadvantages of the electrical system are the constant danger of contact of men and animals with live wires; the possibility of the ignition of gas, dust or other combustible material by the sparking of the wires, blowing out of fuses, possible short-circuiting of the current owing to improper insulation or injury to the conducting wires, and the necessity for expert attendants to oversee the installation and inspect the same from time to time.

Ques.—How would you proceed to extinguish a mine fire of considerable magnitude, in a mine generating explosive gas? State each step fully.

Ans.—If men are at work in the mine, the first consideration is to warn them and provide for their safe escape, as far as possible. This will depend on the location of the fire and the means of escape, which are different in every mine. The worst condition will arise in case the fire is on the intake airway or at the foot of the downcast shaft. In that case, if the heat of the fire does not result in reversing the circulation of air in the mine, the smoke and gases of the fire will be carried in to the workings. Again, the reversing of the air current might prove fatal to the men in the workings, not only by the confusion that would follow, but by gas being carried in large quantities back upon the men. To stop the fan entirely would reduce the quantity of air in circulation and possibly increase the percentage of gas in the workings to the danger point.

It would seem better, therefore, to keep the fan running at its usual speed and short-circuit a portion of the air current at a point inby of the fire, so as to enable most of the smoke and gases produced by the fire to pass out into the main return, assuming that the men can escape from the mine through another opening than the air shaft. The safety of the men will largely depend on the discipline in the mine, the quantity of gas generated and the prompt and intelligent action of the men in charge.

At the same time, while providing for the escape of the men, every practicable effort should be made to extinguish the fire by the use of water hose, steam or other fire-fighting apparatus. When the men have escaped from the mine, if the fire is still gaining headway, it may be advisable to seal it off by building air-tight stoppings to shut off such sections of the mine as may be possible and to seal the top of the shaft or other openings at the surface.

Ques.—What steps would you take to reopen a mine or portion of a mine that has been closed or sealed off to extinguish a fire?

Ans.—When a mine has been sealed off a sufficient time and the hope is entertained that the fire is extinguished, before the seal is broken or the mine again opened, observations should be taken of the temperature in the mine, by lowering a self-registering thermometer down the shaft. Also, air samples should be taken and analyzed to determine the condition of the mine air. These observations should be taken at regular intervals during a period of several days before opening the shaft. Such observations will enable the forming of an intelligent opinion in regard to the progress made in the extinction of the fire. Finally, when the mine is opened, the circulation should be started slowly at first, to remove the noxious gases so that the mine can be explored.

Coal and Coke News

Washington, D. C.

A series of briefs for the defendants in the so-called Reading and Lehigh Valley coal trust suits, denying the Government's charges that monopolization of production and transportation of anthracite coal has been effected by these companies in their respective territories, have been filed with the Supreme Court. The cases are now up for argument and a decision may be expected before the end of this term of court.

The Reading company and the Central Railroad of New Jersey declared in their briefs in the Reading case that only about 20 per cent. of the anthracite trade they are charged with monopolizing actually is controlled by them, and denied that any question of restraint of trade was involved in Reading's acquisition of a majority of the stock of the Jersey road in 1901.

In the Lehigh Valley case briefs were filed by the Lehigh Valley R.R., the Lehigh Valley Coal Co., the Lehigh Valley Coal Sales Co., the G. B. Markle Co. and individual defendants. Conceding that stock of other coal companies was acquired by the Lehigh road to protect its anthracite tonnage, they asserted that this was done in furtherance and not suppression of coal competition.

Competition of the Reading, Erie, Delaware & Hudson and Lackawanna interests, it was declared, made necessary, with the approval of the State of Pennsylvania, the acquisition of coal properties.

"At the present time," said the Lehigh road's brief, "the Lehigh Valley Coal Co. owns, or controls, but 10 3 per cent. of the total anthracite acreage in the three contiguous regions in Pennsylvania—the Wyoming, Lehigh and Schuylkill—and but 22.3 per cent. of the acreage naturally tributory to the Lehigh railroad. That is not monopoly."

It was asserted that coal transportation has become vital to continued existence of the Lehigh railroad. Defending acquisition of the Delaware, Susquehanna & Schuylkill R.R., the Lehigh company's brief asserted that there was little competition between them.

HARRISBURG, PENN.

Less than 38 per cent. of the requests of employers for employees can be filled by the Pennsylvania State Employment Bureau at the present time. The reason is simple—the employees are not to be had.

The director of the bureau says he could easily use twice as many men as are available. But everyone who wants work has it. The employees who are placed through the bureau are those who, usually on account of no fault of their own, find themselves suddenly out of employment, or else they are persons with positions who wish to make a change.

During the year ending Sept. 30 hundreds of employers, which include a great many coal operators, filed with the bureau requests for a total of 29,923 employees. This includes the work at the main office in Harrisburg and at the branch offices in Philadelphia, Altoona, Johnstown and Pittsburgh. During the same period about 20,000 men and women filed applications for work with the bureau. Of this number 14,128 were referred to prospective employers and 11,285 were placed permanently in positions.

Roughly speaking, the employees who pass through the state department bureau are divided into three classes—common laborers, mechanics and office employees. Common laborers are the hardest to get; they are almost not to be had. The director of the employment bureau states that no concern which uses any quantity of labor is paying less than 23c. an hour for a 10-hr. day, and that the bulk of them are paying 25c. During the week the bureau was unable to fill a request for 60 laborers at 33c. an hour. Men who were skilled laborers two years ago are now earning enviable wages at machines in munitions shops.

If the records of this bureau were not entirely confidential the public would be surprised to learn what jobs it is filling. Applications from employers and employees are by no means confined to the general run of positions. A surprisingly large number of places are paying $2,000 to $3,000 a year, and some higher.

Unnecessary Stream Pollution Must Cease

Needless pollution of streams in Pennsylvania by the emptying of refuse from tanneries, acid and dye plants and coal mines, causing the death of food fish, livestock and endangering the health of people residing near the contaminated waters must be stopped or prosecutions will be entered by Attorney General Francis Shunk Brown.

This announcement was made on Oct. 7 by the attorney general to Dr. B. H. Warren, of West Chester, a member of the board of directors of the United Sportsmen of Pennsylvania, who appealed to the attorney general to stop the needless pollution of streams throughout the state. Dr. Warren was advised that in every case where the evidence warranted, prosecutions would be pressed against those guilty of polluting streams in the state.

Complaints against the killing of thousands of fish through stream pollution have been received from points above Scranton and through to Williamsport and other sections of the state. In some instances cattle have died from drinking polluted water. The contaminated water has also endangered the health of persons residing in the neighborhood of polluted streams.

Dr. Warren, on behalf of the organized sportsmen of the state, vigorously protested to the attorney general against the stream pollution. A number of manufacturing establishments and coal operators have placed along the banks of the streams small filtration plants as designed by Dr. Buller of the state fish department.

Drunkenness No Bar to Compensation

That an employee has lost his life just after drinking liquor, or that an employee's death was the indirect result of an injury received while performing his duties for the employer, is not material that may be used by an insurance company in a fight to deny compensation to the dependants, according to two separate decisions by the referees of the board of workmen's compensation. They declare that the use of liquor cannot invalidate the claim to compensation so long as death was caused by an accident sustained in the performance of duty for the employer.

The case was that of a man 60 years old. It was found that he had had several drinks of liquor just before his death. Attorneys for the defendant cited the circumstances at the hearing. Counsel for the claimant declared that whether the employee was intoxicated or not, his dependants were entitled to compensation according to the compensation act of Pennsylvania. The interpretation of the law by the counsel of the claimant was confirmed by the referees, who awarded the widow full compensation. The defendant appealed.

A reading of the law apparently does not justify the decision. The statute says that the employer shall have no defense "unless it be established that the injury was caused by such employee's intoxication or by his reckless indifference to danger," and "the burden of proving such intoxication or reckless indifference to danger shall be upon the defendant, and the question shall be one of fact to be determined by the jury."

It was plainly the intent of the members of the legislature that framed the act to exclude from damages persons injured while under the influence of liquor and their dependants in case of death. It was presumed that every person realized that intoxication caused greater liability to accident and that if he drank to the point of intoxication he committed a willful act of reckless indifference, for which the employer should not be held responsible.

The final decision will be awaited with much interest. If the courts give a liberal interpretation to the law by deciding that drinking to the extent mentioned in the preceding paragraph shall not be a bar to damages, employers will be more careful in the hiring of men.

Safety Devices Have Multiplied

Reports showing a remarkable growth in the number of safety devices installed in Pennsylvania and the development of the compensation system were made on Oct. 6, at the session of the State Compensation Board.

Figures showing the work of the board since it started last January were given by the Commissioner of Labor, who stated it is surprising to note the number of safety devices installed in mills, factories and coal mines since the act went into effect. Amicable settlements have been made in 34,950 cases. There were also 1,300 claim petitions brought before referees, and only 117 appeals have been made from the decisions of the referees to the board. Of the number of appeals to the board, only 12 have been appealed to the courts.

Harry A. Mackey, chairman of the board, was authorized to prepare amendments to the compensation law to correct several mistakes in English and composition which have caused considerable confusion.

Several Italians asked to have their awards in lump sums, so that they may return to their home country. The board is opposed to lump-sum payments on the ground that the money burns a hole in the pockets of the beneficiaries and that many are fleeced out of it by imposters.

Mary Tomazezki, of Pittsburgh, as the result of a decision of the compensation board, which makes death from lightning an accident, will receive 45 per cent. of her husband's weekly wages for 300 weeks, and after that a minor son will receive 15 per cent. of the weekly wage each week until he will be 16 years old, or until Nov. 25, 1929.

The decision was made by the board in the claim for compensation by the woman for the death of her husband, who was killed by a stroke of lightning while at work for the Carnegie Steel Co.

The claim when filed opened up a new matter for decision by the board. After quoting decisions in similar cases in other states the decision of the board concluded:

"There is no question but that the death or injury by lightning constitutes an accident. We are compelled to consider the question as to whether or not a given injury arose out of the nature of the employment, because of the fact that our law has not adopted these words, but rather confines our inquiry solely to whether or not the employee at the time was in the course of his employment for the master.

These facts are admitted of record in this case, so that we only have to turn to Sec. 301, Art. III of the Pennsylvania compensation act of 1915. The facts admitted bring this case within the provisions of that section which provides that the employer shall pay 'compensation for personal injury to, or for the death of, such employee by an accident, in the course of his employment without regard to negligence, according to the schedule continued in Sec. 306 and 307.'"

In another opinion, the compensation board declares it has no authority to make an order for payment of one-third of the amount of compensation allowed for the loss of an eye because an oculist estimates that the normal vision of an eye of an employee has been diminished one-third.

The decision was on appeal of the Pittsburgh & Lake Erie R.R. in the claim of a car-shop employee, whose eye was injured by dirt dropping from the floor of a car under repair. He was able to resume work in 20 days, but it was admitted that his vision had been impaired one-third.

"We do not find in the act any power to graduate an award between provisions of the act," says the opinion. "If in this particular case the lowered vision had not reduced the earning power of the claimant then there can be no compensation based upon any other consideration than actual loss.

The board has no power to make such an order nor even suggest such a disposition of the case. If, however, the defendant desires to make such a contribution to the claimant there is nothing in the law to prevent him from doing so."

Major Operation Is Defined

The Workmen's Compensation Board on Oct. 9 adopted the following definition of the term "major surgical operation." The definition was drafted by Dr. Francis D. Patterson, chief of the Division of Hygiene of the Bureau of Inspection of the Department of Labor and Industry, with the assistance of the following committee of physicians: Dr. John M. Baldy, president, Bureau of Medical Licensure and Education of the Commonwealth of Pennsylvania; Dr. John B. McAllister, president, State Medical Society, Harrisburg; Dr. W. L. Estes, surgeon to St. Luke's Hospital, South Bethlehem; Dr. Robert G. Le Conte, surgeon to Pennsylvania Hospital, Philadelphia; Dr. Edward Martin, professor of surgery, University Hospital, Philadelphia.

"A major operation is a surgical procedure which entails immediate serious consequences to the patient and which requires skill and training to perform and includes:

1. The setting of fractures of long bones and reducing of sublaxations, providing accuracy and efficiency of reduction be demonstrated by x-ray taken before and after surgical treatment.

2. All operative proceedures, other than finger and toe amputations, cleansing, draining and closing wounds, evacuating pus by incisions, and manipulating and reduction of uncomplicated dislocations, the treatment of uncomplicated fractured ribs, the removal of superficial foreign bodies from the eyes, and the removal of subcutaneous foreign bodies.

All fees for a major surgical operation shall be limited to such charges as are reasonable for similar treatment of injured persons of like standard of living in the same community, and where such treatment is paid for by the injured person himself the charges, including hospital service, to be paid by the employer, not in any case to exceed the sum of $75."

PENNSYLVANIA

Anthracite

Hazleton—The removal of a group of railroad yards was recently started by the Lehigh Valley R R. at Jeddo to make room for the G. B. Markle Co.'s mining operations. This firm's coal measures underlie the yards and the surface will be stripped to uncover the coal.

Wilkes-Barre—Unable to agree on the right of the operators to raise the price of the coal sold to miners, the Anthracite Mine Conciliation Board recently referred the question to the umpire. This question is a general one affecting the entire anthracite region. The miners contend that coal comes under the category of supplies which, according to the agreement of May, 1916, shall not be increased in price during the term of the agreement, which is for the next four years. The operators take an opposite view, asserting that coal sold to miners cannot in any way be considered as a mining supply. These they claim are only those things which the miner uses in his work.

Carbondale—The Coalbrook breaker of the Hudson Coal Co., which has been closed down for repairs since Apr. 15 last, recently resumed operations. This breaker has been practically rebuilt. The latest devices employed in coal preparation have been installed therein, including the jig system of washing.

Bituminous

Brownsville—Men for the mines are scarce in Fayette City and vicinity. The Fayette City and Apollo mines are working only about 300 men between them. These two operations at one time employed approximately 750 men. Other mines in the district are similarly affected.

Ralphton—The Quemahoning Coal Co. is making a number of improvements at its Ralphton mine, which when completed will make this place one of the most modern in the western section of Pennsylvania. At No. 5 mine a mixed pressure high-speed turbine, driving a Crocker-Wheeler generator, is being installed. This will be operated by exhaust steam from the power house, and will supply power for mines Nos. 4, 5 and 7.

Connellsville—In spite of the continued shortage of labor in the Connellsville coke region, the region is producing well over 400,000 tons per week. All plants have recently been able to show a slightly higher operating efficiency.

Boswell—The Allen Coal Co., one of Somerset County's new coal-mining firms, will shortly open a new plant in Jenner Township.

Freeport—The influx of Southern negroes, which has been in progress for some time, by reason of the activities of labor agents for Northern railroads, mining and manufacturing industries, is about to be halted, according to information reaching large employers of labor around here. The states of Georgia, Alabama and Mississippi, which have been hard hit by the outflow of black labor, have united to halt the exodus. Labor agents say they are being seriously interfered with and that hundreds of negroes are being arrested and detained on various charges to prevent their leaving for the North. Practically all the Southern negroes here are working at good wages and have given little trouble thus far.

Jerome—Prompt arrival of firemen from Johnstown, Boswell and other mining towns recently averted the destruction of the town. The loss will be in the neighborhood of $30,000. The fire started at 7 o'clock in the evening in a livery stable and before its progress was arrested ten buildings were consumed. At the outbreak of the fire the miners employed in the town formed a volunteer brigade that fought the flames until apparatus arrived from nearby towns. Dynamite and other explosives used by the miners were carried to places of safety, but oil stored in the cellars assisted the progress of the flames. Jerome has about 600 population and is chiefly owned by the Quemahoning Coal Co.

WEST VIRGINIA

Charleston—Mine operators along the Kanawha & Michigan R R. are experiencing a severe car shortage. Coal from some of the mines has been loaded into barges on the Kanawha River and will be shipped to Southern markets by that route. On Cabin Creek where all the mines are on a development basis, it is impossible to ship even 50 per cent. of the normal production because of the scarcity of cars. Shortage of both cars and men is also reported from the Logan fields. An increase of 30 per cent. in production would be possible if the men and cars were available.

Many West Virginia towns still have cases of trachoma, according to a current report of the State Department of Health. It is reported that an investigation revealed the presence of 13 cases among 51 members of miners' families. Among 252 other persons examined in five mining towns, 12 were found with the disease. Mine doctors are urged to examine miners and their families, instruct them concerning the dangers of infection from family and public towels, and urge early operation.

Omar—The Main Island Creek Coal Co. is building 20 new houses for its employees.

Logan—The mines in this field are operating up to the supply of cars and men, but the output could be increased by nearly 30 per cent. without additional mines, provided men and cars were available. Where employers are to secure men and how the railroad is to furnish the cars when new mines are opened on the latter's extension, are things which cannot now be foretold.

Kayford—The mines on Cabin Creek are experiencing difficulty in securing building material for new houses, the construction of which was made necessary by the recent flood. The mines are, however, shipping coal regularly.

KENTUCKY

Pikeville—The damage suit of M. M. Edwards against the Borderland Coal Co., of Borderland, W. Va., near the Kentucky line for personal injuries in the Pike County Circuit Court recently resulted in a verdict for $1,200 against the coal company.

Hazard—The Louisville & Nashville Railroad Co. has opened a station at Raccoon 3 mi. from here where the Columbus Coal Mining Co. is overhauling the old plant of the Douglas Coal Co. Regular freight and express service has been put into operation.

Pineville—R. A. Childs, of Mt. Sterling, acting with Clarence Williamson, of Lexington, and N. R. Patterson, of Pineville, as attorneys for the creditors in the bankruptcy proceedings of the Continental Coal Corporation, a $2,000,000 Bell County concern, has entered a motion in the Federal court at Knoxville, Tenn., asking that the voluntary bankruptcy proceedings in that state be set aside in favor of involuntary proceedings in Kentucky. In case the ruling of the Tennessee court is against the creditors an appeal will be taken, it is stated.

Middlesboro—The power house and other buildings of the Monarch Coal Co. near here were destroyed by fire on Oct. 6. The loss is estimated at $5,000 to $8,000. The origin of the fire is unknown.

Frankfort—Authority to carry their own workmen's compensation insurance under the recently enacted Kentucky law has been given by the board to the Log Mountain Coal Co., of Harrison, and to the Elkhorn & Consolidated Coal and Coke Co. The law is operating smoothly, having been effective since Aug. 1. Altogether 2,650 accident cases have been reported to the state board, of which 150 have been settled and out of which only one contest has developed. This contest hinges on the date of the accident, the person presenting the claim having been unable to prove that the accident occurred before Aug. 1, when the law became effective.

OHIO

Columbus—Four hundred and fifty thousand dollars is the sum offered by John S. Jones, Chicago, Ill., coal operator, for the stocks, bonds and properties of the Buckeye Coal and Railway Co. and the Ohio Land and Railway Co., which the Hocking Valley and Chesapeake & Ohio railroads will ask United States Circuit Judges Warrington, Knappen and Denison for permission to accept.

Disclosure as to the exact amount offered by Jones for these securities was made in an answer filed in United States District Court at Cincinnati by the Central Trust Co., of New York, which is the trustee under the mortgage of the Ohio Land and Railway Co., securing its issue of 20,000 bonds, dated Mar. 1, 1889. In its answer the trust company says that of this issue of bonds $16,156,000 face value have been authorized and delivered and that all of these bonds, with the exception of $130,000 face value, which have been retired by operation of the sinking fund, are in the hands of a large number of firms and corporations as bona fide holders for value. These holders, the trustee says, are in no way connected with the management or control of the Hocking Valley Railway Co., so far as it has knowledge. Court is asked to inquire fully into the value of the two coal companies and to ascertain whether the amount offered by Jones is full and fair value and if it is the best offer that can be obtained.

Athens—The New York Coal Co. has filed three suits in the Franklin County court against the Sunday Creek Coal Co., asking $21,100 alleged to be due on back royalties on the New York properties leased to the Sunday Creek Co. Judgments of about $30,000 are said to have been recovered already for royalties claimed prior to 1915.

Nelsonville—Several mines in this vicinity which have been out of commission for some time are being placed in shape for working, and will add largely to the output in this district. The mines known as Nos. 207 and 209 are being placed in shape, the latter after being flooded by an opening into an old mine. The Floodwood mine is also being gone over.

ILLINOIS

Carlinville—Valerian Shimkus was recently given a verdict in the Circuit Court against the Superior Coal Co. for $5,250 for personal injuries sustained in one of the company's mines at Gillespie, Ill. The coal company entered a motion for a new trial.

Gillespie—L. Grabner, of Sawyerville, in skinning a mine mule that had been turned over to him by the Superior Coal Co., found under the animal's skin, at the shoulder, a 1½ karat diamond. It is supposed to have been placed there after the animal's death to conceal it. No one has claimed it.

Collinsville—Several suits have been brought by railroad companies here against Alton coal dealers for demurrage. The suits are the outgrowth of a dispute as to whether the railroads are entitled to pay for car service. An attempt was made some time ago to reach an agreement and it was understood that the dealers would pay but the filing of the suits indicates that there has been no settlement.

Belleville—Operations have been resumed in the Royal, Rentchler and Freeburg mines, in the Belleville district, after an idleness of more than a year. The Royal and Rentchler shafts are on the Louisville & Nashville R.R. and are manned by Belleville miners. The Freeburg mine is at Freeburg, on the Illinois Central. These three shafts and the Senior mine at Belleville have passed under the control of John Henderson, president of the West Virginia Coal Co., of St. Louis. The output of the four mines will be about 2,000 tons per day.

Quincy—The Ohio Coal Co. has located a vein of coal on the Elizabeth Moore farm, 1½ mi. east of Beverly, according to a memorandum and diagram filed in the office of Recorder James Buffington here. The papers are signed by J. H. Masson, superintendent of the company. The coal was found when the company was boring for oil. It is 100 ft. below the surface and is 4 ft. thick. This is the first coal that has been found in the county at the 100-ft. level. The quality is said to be excellent. The Moore farm is 7 mi. from a railroad. Efforts will be made to strike the vein nearer the railroad, in which event a company will be organized to develop it.

Edwardsville—Workmen recently began pumping out the Henrietta coal mine northwest of town, so that prospective buyers might enter the workings to see their condition. This mine is now owned by an East St. Louis firm, which has several prospective purchasers for the mine.

Tamaroa—Coal options have been taken on several hundred acres of land a short distance east of town and the interested parties will, it is reported, within a short time begin boring to ascertain the thickness of the coal beds and the quality of the coal underlying the surface. The first borehole will be put down on the farm of William George, about two miles east of town.

ARKANSAS

Fort Smith—Suit asking damages in the sum of $51,300 has been filed against the Greenwood Coal Co. by John Bernardo, miner, who alleges that on Sept. 17, 1915, while working on the tipple, a switch was thrown without warning and his foot was badly crushed.

OKLAHOMA

Tulsa—With the sale of the Mohawk Mining Co.'s interests in Tulsa County to the Fargo Contracting Co., of Jacksonville, Fla., comes the announcement that this company will spend $2,000,000 in uncovering the surface beds of coal in the vicinity of Dawson and that coal mining in this county will take on larger proportions than ever before. In taking over the Mohawk company's interests, the Fargo company purchased the big steam shovel, said to be the largest of its kind in the world, which has been engaged in removing the earth from the surface beds of coal. Officials of the Fargo company announce that they will purchase other steam shovels like this one and all will be put to work at once. While it is declared by coal men in this section that the contract of the Fargo company to uncover a large area of surface coal does not mean newly discovered deposits, it is freely admitted that such wholesale operations will likely uncover new and hitherto undiscovered beds. It is estimated that it will take three big shovels working steadily all the time for at least five years to uncover the deposits taken over by the Fargo company.

WASHINGTON

Seattle—The big coal mines at Issaquah, about 12 mi. from Seattle, embracing 1,280 acres, have been purchased by F. B. Lack and P. C. Kittle, of California, who, with their associates, have organized the King Coal Co., Inc., which will start operations at once. This mine was formerly owned by German interests who spent about $1,000,000 in developing and equipping the property making it one of the best equipped properties in the state. The German company got into financial difficulty at the outbreak of the war, and the Northern Bank and Trust Co. acquired title as trustee for the mortgage under foreclosure proceedings. Now all these interests have been acquired by the King Coal Mining Co. The property is equipped and developed for a daily capacity of 1,500 tons and the present development shows coal enough to maintain a production of 1,000 tons a day for a period of 50 yr. The mine will give employment to about 200 men. The management of the property will be in the hands of P. C. Kittle.

Personals

S. Makawags, of the Japanese Imperial Bureau of Mines, recently visited the anthracite coal mines in the vicinity of Pottsville, Penn.

C. W. Hays, formerly with Boyts, Porter & Co., Connellsville, Penn., is now associated with the Ross Mechanical Supply Co., Ross and Water St., Pittsburgh, Penn., in charge of the pump department.

Obituary

Hamilton Bolen, aged 43, was recently found dead in his bed from heart disease. For six years Mr. Bolen had worked in the Atlas Coke Co.'s mine, near Waltersburg, Penn., without an accident. He also took a five-mile walk daily. During the two weeks preceding his death he had worked 21 shifts and walked 70 mi. to and from the mines.

Philip Goodwill, of Bramwell, W. Va., died recently at his home from what is believed to have been a broken blood vessel in the brain. He was born at Gold Mine Gap, Penn., in 1852. Coming to West Virginia in 1887, where with his father, he opened the mines of the Goodwill Coal and Coke Co., at Goodwill, and was actively engaged as general manager of the company until 1897, when these mines were sold. The following three years he was engaged as the president of the Pocahontas Co., after which he retired from active business. At the time of his death he was a director of the Pocahontas Consolidated Collieries Co., in which capacity he had served since the organization of that firm. He was also interested in a number of other enterprises. He is survived by his wife and three sons, also by two brothers, both residing in Shamokin, Penn.

Industrial News

Louisville, Ky.—The Dixie Coal and Coke Co., with a capital stock of $5,000, has been incorporated. The incorporators are H. G. Petrie, T. W. Barker and C. G. Petrie. The debt limit is placed at $15,000.

St. Louis, Mo.—The St. Louis Coal Club will have a meeting Monday evening, Oct. 16, at the American Annex, at which Fire Chief Henderson will talk about the work of the fire department and show stereopticon pictures.

Hazard, Ky.—The Columbus Coal Mining Co., one of the largest in the Hazard field, has let contracts for the erection of 100 miners' houses at the new plant 1 mi. below Hazard in "The Bend." Work is to start at once.

Portsmouth, Ohio—The Portsmouth Solvay Coke Co. has been incorporated with a capital of $2,000,000, to operate coke ovens. The incorporators are Alexander Glass, J. G. Hazard, H. G. Battelle, J. C. Miller and J. H. Frantz.

Chattanooga, Tenn.—A committee of the Southern Coal Operators' Association has been instructed to present an appeal to the Interstate Commerce Commisison to compel Southern railroads to return coal cars from Northern and Eastern districts.

Whitesburg, Ky.—Operators of the southwestern Virginia coal fields contiguous to the Kentucky border say the coal-car shortage which has been injuring the business of mining for several weeks shows much improvement at this time. From five days per week all the coal operations are now running every day in the week, with some night shifts.

Louisville, Ky.—Several thousand answers were received to the invitation of the Wallins Creek Coal Co. to the public to submit a trade name for the coal mined and sold by the company. The company at length determined on a matter-of-fact name, which advertised the coal, and it will be sold as "Wallins Creek Coal." The winner gets 100 bushels of the coal she named.

Cincinnati, Ohio—Danger of a coal shortage during the winter months is regarded as serious by coal men, unless a stage of the river which will permit the shipment of coal by that medium is had soon, or unless the present car shortage in the West Virginia and eastern Kentucky mining districts is remedied. The heavy demand from the Northwest, coupled with the crippling of the Cabin Creek District, has aggravated the situation, and the trade is extremely pessimistic over the prospects for meeting a normally heavy winter demand.

Washington, D. C.—Freight tariffs of the Cincinnati, Hamilton & Dayton R.R. providing for the nonabsorption of switching charges of connecting lines at Cincinnati on carload shipments of coal when destined to local stations on the Cincinnati, Indianapolis & Western R.R. were recently suspended by the Interstate Commerce Commission from Oct. 1 until Jan. 29 next. Under the present rules connecting lines switching charges on such traffic are absorbed by the Cincinnati, Hamilton & Dayton. The Commission will conduct an investigation into the reasonableness of the proposed change.

St. Louis, Mo.—In the suit of the White Oak Coal Co. against the Ed E. Squier Co., in the Circuit Court, in which the White Oak company sought to collect $2,766.94 alleged to have been lost by the White Oak Co. by reason of the failure of the Squier company to accept consignments of New River Smokeless coal, a verdict has been rendered in favor of the plaintiff for $193.98 on the first count and in favor of the defendant on the second count. All costs subsequent to tender on first count and all costs on the second count are assessed against the plaintiff. The suit grew out of a dispute about the quality of the coal furnished.

Cincinnati, Ohio—The United States Circuit Court of Appeals has been asked to consent to the sale to John S. Jones, of Chicago, of the various properties of the Buckeye Coal and Railway Co. and the Ohio Land and Railway Co., including stocks, bonds and realty, for $450,000. The securities are those which the Hocking Valley Railroad Co. and the Chesapeake & Ohio own in their capacity as members of the so-called coal trust, which has been ordered by the court to be dissolved. The two companies specifically deny the jurisdiction of the court to compel them to surrender these securities, but admit their willingness to follow the precedent set in the Sunday Creek case.

Harrisburg, Penn.—The appeal of Richard Jones, of Exeter, a former mine foreman for the Lehigh Valley Coal Co., from the decision of the Superior Court, directing his trial on the charge of receiving money from a miner, has been refused consideration by the Supreme Court and the case will likely be tried at the next term of the criminal court in Luzerne County. This case has attracted considerable attention since the arrest of the mine foreman on complaint of Miss Emily Johnson, a social worker, several months ago, charging him with receiving money from mine employees. When a true bill was found the indictment was dismissed by the lower court as being defective. The commonwealth took the appeal to the Superior Court, which reversed the judge of Luzerne County and directed trial of the case.

Coral, Penn.—Early in October the Wharton Coke Co.'s plant at Coral, Indiana County, Penn., consisting of 300 ovens and 2,500 acres of coal, was purchased and taken over by the Potter Coal and Coke Co., a recently organized corporation. The future promises a successful operation of the property, with better working and living conditions for the workmen and their families at Coral. The Potter Coal & Coke Co. is made up of men who thoroughly understand the coal and coke business, and who have had years of experience in the mining of coal and the manufacture of high-grade foundry coke. They will modernize their Indiana County property and intend to install modern methods of coal preparation and will put on the market several selected grades of steam and domestic coal as well as high-grade coke.

Baltimore, Md.—The Western Maryland Railway Co. on Oct. 4 placed an order for 2,000 steel hopper cars with the Pullman Co., of Pullman, Ill. The new equipment will require an expenditure of approximately $3,000,000. The present order makes 5,000 new steel hoppers which the Western Maryland has purchased within the last eight months. Last Fall 3,000 hoppers were bought from the Pullman company and all of these have been delivered. The increasing coal tonnage of the Western Maryland necessitated the purchase of additional equipment. New branch lines have been placed in operation touching mining properties from which the railway company has not heretofore drawn traffic. Still another branch will be finished in January, and the business handled over this line will further the company's fuel traffic.

Toronto, Canada—For some years there have been complaints in the Maritime provinces that sailing vessels in the coasting trade were not getting their fair share of coal cargoes, but were being discriminated against in favor of steamers. The question engaged the attention of the Prince Edward Island legislature which last session passed a resolution calling for a royal commission to look into the matter. In compliance with this request the Canadian government has appointed a commission consisting of Wilfrid Tupper, inspector of subsidized steamship services; Sir Archibald Tibbits, officer in charge of harbor commissions; and J. F. McDonald, customs collector of New Glasgow, N. S., to investigate and report upon conditions with regard to the delivery of cargoes of coal to the coasting vessels in the Maritime provinces.

Columbus, Ohio—The Jeffrey Manufacturing Co., of Columbus, has opened an agency with the Gustin-Bacon Manufacturing Co., a large and old-established firm of Kansas City, in order to establish closer co-operation with its customers in Kansas, Missouri and Oklahoma, and improve the service there. The Gustin-Bacon Co. will carry a line of Jeffrey transmission machinery, chains, buckets, etc., in stock. J. S. Davidson, who has spent several years in the sales and engineering departments of the Jeffrey company has associated himself with the Gustin-Bacon Co. and will handle all inquiries for Jeffrey products. His experience and training in the application of these products will enable him to be of great assistance to customers in solving their problems in elevating, conveying and transmission machinery, also crushing, pulverizing and screening equipment.

Washington, D. C.—A fourth section order has been entered by the Interstate Commerce Commission granting the application of the Baltimore & Ohio Southwestern R.R. to charge lower rates on coal from West Virginia and Kentucky mines to destinations connecting with the Norfolk & Western, than to the intermediate points. The commission in this connection ordered: "That the petitioners herein be, and they are hereby, authorized to establish rates on bituminous and cannel coal, carloads, from stations on the lines of the Chesapeake & Ohio Railway Co. named in its tariff I. C. C. No. 6,543 and from stations on the Sandy Valley & Elkhorn Ry. and the Carolina, Clinchfield & Ohio Ry. to Hillsboro, Ohio, via the route of the Chesapeake & Ohio Ry., Cincinnati, Ohio, and the Baltimore & Ohio Southwestern R.R., the same as the rates contemporaneously in effect on like traffic from and to the same points via the more direct route through Kenova, W. Va., and the Norfolk & Western Ry., and to maintain higher rates to intermediate points, provided that the present rates to the said intermediate points shall not be exceeded."

STATEMENT OF THE OWNERSHIP, MANAGEMENT, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

of Coal Age, published weekly at New York, N. Y., for October 1, 1916.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and County aforesaid, personally appeared Chester W. Dibble, who, having been duly sworn according to law, deposes and says that he is the Vice-President of Hill Publishing Co., Publishers of Coal Age, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

Publisher, Hill Publishing Company, 10th Ave. at 36th St., New York, N. Y.
Editor, Floyd W. Parsons, 10th Ave. at 36th St., New York, N. Y.
Managing Editor, Floyd W. Parsons, 10th Ave. at 36th St., New York, N. Y.
Business Manager, Joseph E. Sample, 10th Ave. at 36th St., New York, N. Y.

2. That the owners are:

Hill Publishing Company, 10th Ave. at 36th St., New York, N. Y.

Owners of 1% or more of Stock Issued.

Estate of John A. Hill, 10th Ave. at 36th St., New York.
Arthur J. Baldwin, 10th Ave. at 36th St., New York.
Fred R. Low, 10th Ave. at 36th St., New York.
John McGhie, 10th Ave. at 36th St., New York.
Fred S. Weatherby, 1600 Beacon St., Brookline, Mass.
Frederick A. Halsey, 356 W. 120th St., New York, N. Y.
G. Eugene Sly, 50 Union Sq., New York, N. Y.
Frederick W. Gross, 215 E. 11th St., Erie, Penn.
Emma B. Hill, 80 Munn Ave., East Orange, N. J.

The remaining stock is owned by 91 stockholders who own less than 1% each, 73 of whom are employees of the company.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages or other securities are: Mortgage on building, Dime Savings Bank, Brooklyn, N. Y.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

CHESTER W. DIBBLE,
Vice-President, Hill Publishing Co.

Sworn to and subscribed before me, this 29th day of September, 1916.

[Seal] RICHARD L. MURPHY.

(My commission expires March 30, 1917.)

Market Department

GENERAL REVIEW

Efforts to increase anthracite production meet with small success. Bituminous market shows the erratic features incident to abnormal conditions. Insistent demand for Pittsburgh district coals in the Eastern markets. Flurries of excited buying in the Middle West.

Anthracite—Urgent pressure for coal continues the dominating feature of the hard-coal market. The closest scrutiny of the situation fails to disclose any chance of a possible reaction, with the exception that the abnormally heavy buying at this time may result in the accumulation of sufficient stock to relieve the pressure next month. In spite of the efforts to increase production, the current statement of anthracite shipments issued this week indicates that these efforts have not met with much success. Although the September shipments show a slight increase over August, and a substantial gain for the nine months' period of this year as compared with last year, the respective tonnages for September of this year and last year show a discouraging loss in the current statement, indicating a reduced capacity at the mines. In the big consuming districts of the Central East, the market is, of course, active but fairly normal, and there is a general feeling that there will be adequate supplies if it is possible to make proper distribution. In the Middle West anthracite is so short that some of the consumers are beginning to substitute Western grades, in spite of which the demand continues as urgent as ever, due largely to the delayed ordering.

Bituminous—The market continues to show all the erratic features characteristic of abnormal conditions. Stocks are apparently at an irreducible minimum with some manufacturing interests working on dangerously small margins, prices continue to advance in nearly every field, producing interests show no prospects of being able to increase outputs, while the car scarcity is becoming so acute that the railroads are beginning to declare embargoes against shipments off their respective lines, and agencies are exceedingly hard pressed to secure sufficient equipmnt to meet their contract obligations. Evidence of the unsettled condition of the market is seen in the disruption of the customary channels of trade, such as, for instance, the shipment of Ohio and Pittsburgh coal into the New York market. Predictions as to the future trend are generally vague, with the exception that all are agreed that further advances are undoubtedly in sight.

Lake Market—The most significant development of the past week has been an insistent demand for Pittsburgh district coal in the East; some very fancy prices are being offered on this business but the tonnages involved are relatively small and these prices can scarcely be considered the true market. The stringency grows more intense each week, and it is now closely bordering on a runaway situation, with a coal famine threatened in some sections. Assurances of a heavy consumption in the iron and steel districts is having a potent influence on the general market. Conditions have been further accentuated by exaggerated newspaper reports which have created a fictitious demand and made prices so erratic that purchases should be subjected to the most careful scrutiny. The slowing up in the Lake movement occasioned by the genral shortage is well substantiated by the current statement of shipments through the canals, which show a heavy decline. Particular significance attaches to the very strong situation now prevailing in view of the fact that the weather has been comparatively mild and the advent of lower temperatures will undoubtedly stiffen the market up still further.

Middlewest—Mines in this section are running generally 60 days behind on orders, and there are occasional flurries of very excited buying. Conservative observers are of the opinion that the situation has never been more active in the last 25 years, though operators are not deriving any very great benefit due to the scarcity of coal occasioned by car and labor shortages. Shipments to the Northwest continue to increase, and it is now a generally accepted fact that the supplies at the upper Lake ports will fall substantially below requirements unless there should be a most unusually mild winter. Prices are fluctuating over a wide range, but there is so little spot coal available that the business negotiated is at a minimum so that even these quotations are purely nominal. The car situation becomes more serious as the season advances.

A Year Ago—Anthracite distribution at record rates for the season and prices stiffer. Growing labor and car shortages are features of the bituminous situation. Substantial advance in vessel rates restricts exports. Consumption in iron and steel lines at maximum rate.

BUSINESS OPINIONS

Boston News Bureau—The more one studies the new phase of the German submarine situation the more one is compelled to believe that Germany has acted within her rights. The same thing has happened in European waters many times. The only way it seems different to us is that this time it was near our shores. But whenever German submarines get active it throws a chill over this country and the world. There are too many favorable conditions, however, for people to lose their heads. The greatest era of industrial prosperity the country ever saw is a matter of record, and the profits piling up are a source of strength, both present and prospective. The attention of the country will shortly be focussed on the national election. This cannot do otherwise than exercise a pronounced influence upon sentiment. The decrease of 137,773 tons in the unfilled tornage of the United States Steel Corporation Sept. 30, compared with the previous month, is of no improtance considering that the unfilled tonnage now stands at 9,522,584 tons.

Steel Orders—The United States Steel Corporation reports a decrease of 137,773 tons during September in the amount of unfilled orders on hand. At the end of the month the total of forward business on the books aggregated 9,522,584 tons. The falling off was not expected in steel circles, although the increase that was looked for was expected to be small. The corporation, like other steel companies, has been refusing many thousands of tons of business weekly, and it is not considered desirable to line up contracts much in excess of 9,500,000 tons with the mills working at capacity. A year ago bookings amounted to 5,317,618 tons, and on June 30 they totaled $9,640,458 tons.

Marshall Field & Co.—Wholesale shipments of dry goods for the current week have been in larger volume than for the corresponding period of past years. Road sales for immediate delivery show good gains over the same week 1915. Continued heavy buying for spring indicates that merchants have every confidence in the continuance of good business. Merchants have visited the market in larger numbers than a year ago. Collections for the week are above normal. Prices are firm and advancing.

Bradstreet—Quick time continues the marching order in practically every line of endeavor, with new and higher levels being attained, to the tune, however, of soaring prices, penalties, by the way, of superabundant prosperity in the face of short crops or straitened supplies of raw materials. The cry is that there are not enough cars to haul commodities, that there is not enough labor to hasten production, and there are not enough goods to supply insistent demands. Wants, apparently, are insatiable, current demand being for present needs, for winter, for the holidays and for next spring. Consequently current reports merely accentuate those regarding past activity, and it is evident that jobbing trade, mail-order business and distribution by retail dealers is of record proportions. Buying for the holidays is active and fall festivals have accelerated the pace.

Dun—It is an economic phenomenon that the highest prices of modern times, while causing natural hesitancy in certain quarters, fail to check the growth of business. Costs in many lines, in spite of the previous extensive advance, are still rising steadily and in some cases rapidly, yet each week the magnitude of demand, continuing after months of unprecedented buying, becomes more noteworthy. There is not an industry of any importance in which orders, following much less than the customary summer abatement, are not again increasing, and if in some branches the expansion is limited it is principally because of the inability or disinclination of manufacturers to commit themselves further. Commercial failures this week in the United States are 261 against 284 last week, 289 the preceding week, and 343 the corresponding week last year.

Dry Goods Economist—In all lines of dry goods the market situation is becoming more and more serious. Numbers of converters, jobbers and retailers who hitherto have held off persistently are now coming into the market for spring supplies and, realizing the results of their delay, are absolutely besieging the mills, selling agents—in fact, anyone who has the goods—to accept their orders. The higher the price the greater seems to be the desire of such buyers to provide for their prospective wants. Both because of this increased demand and on account of the continuance, or rather intensification, of conditions which have long prevailed, prices on all lines are still advancing. Yet many manufacturers show increased unwillingness to accept orders and many others will not accept contracts extending over so long a period as buyers desire.

MARKET OPINIONS

Kingsbury-Sheperd Coal Co. (by H. N. Kingsbury, President), Indianapolis, Ind.—The current market is very unusual on account of the car situation, and the heavy demand for coal. There is no indication of a return to normal conditions for at least 60 days from date, Oct. 5. The prompt movement is light, and the contract movement very unsatisfactory because of the inadequate car supply. Prices on contract are slightly above those of last year, but in the spot market they are excessively high. Generally, conditions are very unsatisfactory, though this may be accounted for by the poor car supply and strong demand which in our opinion will increase rather than decrease.

The Harlan Coal Co. (by K. U. McGuire, President, Louisville, Ky.—The current situation looks like a runaway market which will continue through the entire fall and winter. In our opinion the railroad tie-up has been merely postponed by the Adamson bill. Operators have scarcely anything except domestic coal for sale. Most manufacturing interests are depending on current arrivals to keep their plants going. On what little free coal there is available prices are about 50c. per ton higher than a year ago. The arrival of winter with the railroad trouble still impending will make conditions due to car shortage still more acute, and only a sudden stoppage of general business can bring about a readjustment to more stable conditions.

Breese-Trenton Mining Co. (by A. H. Beddoe, General Sales Agent), St. Louis, Mo.—The current market is satisfactory, with prices bullish and the movement very good. Prices on both spot and contract are higher than a year ago. The car supply is below normal, and the outlook is for continued car shortage and high prices.

White Oak Fuel Co. (by Thomas R. Hanis, Manager), St. Louis, Mo.—The market is high, owing to car shortage and large demand from steam plants. The outlook is for still higher prices. Contract prices are 10 to 15c. above last year on contracts placed early in the summer, but the current market is 50c. higher. As a result of the car shortage, some of the Illinois mines are only running two days a week. Most of the leading coal carriers in this district are apparently short of equipment.

Piedmont & Georges Creek Coal Co. (by S. J. Bohannon), New York—The situation is largely a speculative one with prices forced too high. The outlook is good with prices ranging 50c. up and down. The prompt movement is slow on account of the car and labor shortage, and the contract movement is as good as could be expected, considering the current business. Spot prices are $1 to $1.50 higher than last year, and contract figures about 25c. up. There is every indication of an active winter for the companies, but free coal will be so limited that the net gain will be small.

Linton Collieries Co. (by M. E. Mogg), Indianapolis, Ind.—The current market is very good with the outlook the same, and the movement, both prompt and contract, good. Spot prices are 25 to 40 per cent. higher than a year ago and contract prices up 10 per cent. There is a car shortage in Indiana, mines only getting about 60 per cent. of their regular car supply.

E. L. Hedstrom Co. (by E. C. Roberts), Buffalo, N. Y.—The current situation is abnormal, the outlook uncertain, and both the prompt and contract movements poor. Current prices in the spot market are fully $2 above this time last year. Shortage of cars, scarcity of labor, poor movement on the part of the railroads, and the unprecedented demand from all quarters, has resulted in conditions that are unequalled since, and immediately following the big anthracite strike of 1902 and 1903.

B. Nicoll & Co. (by E. Kelly Rothstein, Manager Coal Dept.), New York—There is a strong tendency toward further increases, and in our opinion the current situation now hinges largely on whether the demand is sufficient to absorb the tonnage that will soon be released by the closing of Lake navigation. The contract movement is very good. Prices are approximately 50 to 70c. per ton higher than a year ago.

OFFICIAL CONTRACTS

Baltimore, Md.—The city government will receive bids until 11 a.m., Oct. 18, for furnishing bituminous coal under two separate schedules, one involving approximately 8,900 tons and the other 19,000 tons. Specifications may be had on application accompanied by a deposit of $5. Address Board of Awards, City Hall, Baltimore, Md.

Canton, Ohio—When county officials were to open bids recently for the coal supply for the county infirmary, none were received. The officials will readvertise for coal bids.

Atlantic Seaboard

BOSTON

Hampton Roads coals still confined closely to contracts, but free coal offers occasionally at high prices. A share of the spot trade is between shippers anxious to clear boats. Georges Creek cargoes few and far between. Anthracite situation still more serious.

Bituminous—The market seems to be in settled shape for the next three months. It is hard to see how there can now be any easing up in conditions at least until after Jan. 1. With all the possibilities of delay in loading and the slow movement of boats along the coast there is so little chance of a reaction that it seems idle to discuss it. The clear weather has been very favorable to deliveries and yet the supply of Pocahontas and New River has become tighter and tighter. At Hampton Roads $4.50 is now the quotation for spot coal, although a good share of the purchases are by shippers who are themselves short of coal for steamers waiting to load.

In New England most of the agencies continue to keep up deliveries on contract without getting too far in arrears. A few have gone down into their pockets in order to keep certain plants supplied, but that is not the general rule. There also continue to be purchases of all-rail coal on the part of Tidewater distributors. It is beginning to be apparent that the large consumers in this territory have been particularly forehanded this season and are in reasonably comfortable position for the present.

It happens that the free coal available is just about equal to the relatively small demand. If there were more confidence in the marine freight market and present high quotations on coal joined together there would probably be an active interest on the part of speculators. As it is, the opportunity to lose 50c.@$1 a ton is an ever-present possibility and the current market here is by no means broad enough to tempt any very heavy operations of the kind. At Mystic Wharf, Boston, and f.o.b. cars Providence prices have eased a little since a week ago, but it is due more to a fluctuating demand than to any visible increase in supply. At Portland and Bangor similar coals are selling close to $7 on cars.

An occasional arrival of tows at New England points shows an effort on the part of Georges Creek shippers to catch up on their contracts. The lack of miners and the shortage of cars are still factors in the status of this grade.

The market for the Pennsylvania steam coals gains strength every day. A number of operators who sold rather freely in July and August now find themselves put to it to make deliveries and in consequence have withdrawn for the present. Others are still in position to sell at high figures. As in the case of Tidewater coal at Boston there is very little coming forward to this point on consignment.

Bituminous at wholesale is quoted about as follows, f.o.b. loading ports at points designated, per gross ton:

	Clearfields	Camb. & Som's't	Geo'gs. Creek*
Philad'la...	$3.65@4.05	$3.85@4.35	$3.07@3.17
New York..	3.95@4.35	4.15@4.50	3.37@3.47
Baltimore..	.....	.....	3.00@3.10
F.o.b. mines	2.35@2.80	2.60@3.10	2.00@2.10

* On contract.

Pocahontas and New River are quoted at $4.50 f.o.b. Norfolk and Newport News, Va., and $6.50 @6.75 on cars Boston and Providence for inland delivery. Miller Vein coals are quoted at $6.25 alongside Boston.

Anthracite—The size of the premiums demanded on independent coal is opening the eyes of retailers here to the serious possibilities ahead. September was the most favorable period this year for large movement and in a measure allayed the anxiety of local dealers, but should there be a week or two of gales or thick weather the situation here would rapidly become acute. As it is, there is a marked shortage of egg and stove, and to a less degree of broken. Dealers have accepted deliveries of chestnut and pea for so long that some are not in shape to take the quantities necessary in order to get the sizes more desired.

There are a few who think conditions will get easier, basing their opinion on the heavy business which has kept up for nearly a full year. Should there be a mild winter there might conceivably be enough of a sagging off in demand to make better shipments possible. Part of the trouble, however, is due to the inability of the mines to satisfy the abnormal demand which has been pressing all season long. In some cities in New England a cargo melts right away as soon as it is received, so great is the call for it from the householder.

As high as $9 has been asked for cargoes of independent coal alongside Boston, carrying a proportion of stove and egg. Retail prices in Bangor, Augusta and Rockland have recently been advanced to a $9 basis.

NEW YORK

Anthracite gaining strength and premiums growing. Heavy demand for all domestic sizes with stove leading. Steam coals normal and prices steady. Bituminous demand active with prices high. Brisk call for export and bunker coals.

Anthracite—There is more talk of premium coals than there was last week. Demand is stronger and individuals are able to obtain advances ranging from 50c. to $1. Considerable anxiety is manifested as to the future but there will be plenty of coal to go around providing there is proper distribution.

Most of the premium offers come from New England and Long Island Sound points; local dealers unless actually forced, are not inclined to pay more than regular prices. Mine prices are higher than on the Tidewater basis, $5 having been quoted for equal shipments of egg, stove and chestnut. For separate shipments of either stove or egg 25c. more has been quoted.

There has been no let up in the demand for stove coal which has been the shortest for several weeks. Many dealers who have small yards are practically cleaned out of this size and are urging consumers to take either egg or chestnut instead.

Egg is in good condition and more in evidence than the next largest size. Chestnut is tighter and in better demand.

The buckwheats are steady. The few days of warm weather tended to lighten the demand and so far there has been no unusual rush. The better grades are scarce while the cheaper coals bring full circular. Buckwheats Nos. 2 and 3 are tightening.

Current quotations, per gross ton, f.o.b. tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	$4.95	
Egg	5.45	$5.45@6.50
Stove	5.70	5.70@6.75
Nut	5.75	5.75@6.50
Pea	4.00	4.00@4.25
Buck	2.75	2.75@3.00
Rice	2.20	2.20@2.25
Barley	1.95	1.95@2.00
Boiler	2.20	.....

Quotations at the upper ports are generally 5c. higher on account of the difference in water freight rates.

Bituminous—There is a buyer waiting for every car of coal produced. Demand continues heavy and $3 coal at the mine has practically passed out of the market. Some wholesale dealers look for $5 coal within the next few weeks and surely not later than Dec. 1. Producers are not able to increase the output and there is no letup in consumption. Demand from New England is stronger and most of the high-priced coal is going there.

While it is believed there is some speculative buying most of the shipments are for immediate consumption. More central Pennsylvania coals are going into New England than under ordinary conditions owing to the shortage of New River and Pocahontas grades and the higher prices quoted. The railroads continue in the market.

Central Pennsylvania coals are held at from $3.15 to $3.25 at the mines with most of the sales being made at the highest figure; this would make Tidewater prices for these coals $4.70 to $4.80. Fair grades of gas coals are quoted at $3 at the mines and some Ohio grades have been shipped here to relieve the situation.

There has been a brisk call for export and bunker coals. With increased freight and insurance rates and the fear that the vessel may never reach its destination it is expected that shipments may now fall off.

Current quotations, per gross ton, f.o.b. Tidewater, for various grades are as follows:

	South Amboy	Port Reading	Mine Price
George Crk. Big Vein..	$4.50@4.75	$4.50@4.75	$3.15@3.65
Tyson.....	4.25@4.50	4.25@4.50	2.90@3.25
Clearfield...	4.25@4.35	4.25@4.35	3.15@3.25
South Frk..	4.25@4.50	.....	3.15@3.25
Nanty Glo.	4.25@4.50	.....	3.15@3.25
Som'r. Co..	4.15@4.25	4.15@4.25	2.90@3.00
Que'ho'ing..	4.25@4.35	4.25@4.35	3.00@3.10
W. V. Fa'rm't Th'r'qua.	4.20@4.30	4.20@4.30	2.75@3.00
Mine-run....	4.10@4.20	4.10@4.20	2.50@2.70
West. Md..	4.10@4.20	4.10@4.20	2.90@3.00

PHILADELPHIA

Dealers' stocks low and car shortage ominous. Storage pea coal coming out. Urgent demand for broken strengthens egg. Stove scarce and nut active. Buckwheat easier. No premium coal yet. Bituminous prices advance daily, with $3 now the average.

Anthracite—The car shortage now looms as a serious menace for practically the first time this season and has prevented many of the shippers from making any headway on their orders this week. One of the largest companies has not had sufficient cars to warrant picking up chestnut and pea from their storage piles, though they have enough business to use this coal. Another company, whose production is below normal owing chiefly to labor conditions, has been shipping large quantities of storage pea to Philadelphia. The coal has been rescreened and is giving entire satisfaction. They have an immense quantity of chestnut in storage but none of it is being consigned here as yet.

The demand for broken coal is more than urgent, as the smaller operators have practically stopped making it and the big companies are refusing new business. Users of this size are freely offering $4, or 50c. per ton in excess of the contract rate, in their efforts to accumulate a few weeks' supply.

Egg coal remains somewhat quiet locally, but as the demand at outside points continues strong there is no effort being made to move that size here.

Stove-coal demand increases weekly, and the shippers are trying to avoid taking any additional business by discouraging buyers and telling them there are no prospects for prompt shipments. One company stamps all acknowledgements for this size "subject to delay."

Chestnut-coal requisitions have increased so rapidly that this size is now giving the operators no little concern. In fact, some popular grades are in very short supply.

No one is having any trouble to move their production of pea coal and dealers are not hesitating to stock to their limit. The retailers state that many buyers who formerly ordered chestnut, or chestnut and pea mixed, are now buying straight pea coal. Naturally the high prices have influenced the change.

As to anthracite steam coal there seems to be, if anything, a slight lull in buckwheat, the only real active size, but this is certainly only temporary. All the large companies seem to have an abundant supply of this size and their sales are all being made at the $1.50 figure, although none of the individual shippers quotes a figure lower than $1.80 and in most instances ask $2. The smaller sizes remain in about the same position they have occupied for the past month.

Collections are very good; in fact, the opinion seems to be general that they were never better and all the sales agents are relieved to think that with this matter practically taking care of itself, they are free to give their entire attention to the business of shipping coal.

The circular prices per gross ton, f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide, are as follows:

	Line	Tide		Line	Tide
Broken	$3.60	$4.75	Buck....	$1.65	$2.55
Egg.....	4.15	5.25	Rice.....	1.00	1.90
Stove....	4.40	5.60	Boiler....	.90	1.80
Nut.....	4.50	5.55	Barley...	.75	1.65
Pea.....	2.80	3.70			

Bituminous—The price advance continues and almost every day sees increases of from five to ten cents per ton. For the first time the Fairmont coals have touched the $3 mark; there are grades still quoted as low as $2.40, but the popular price when quotations are asked is $3. No one seems willing to predict the future as to prices, except that figures are sure to be higher and within ten days at the most the lowest quotation will certainly be not less than $3.

The supply of cars has grown worse, and none of the bituminous carriers are furnishing the mines on their lines more than 25 per cent. to 30 per cent. of their requirements. One of the large roads has pressed into the coal service every available car, even going so far this week as to take dirt cars out of their construction and roadway service. There continues to be a fair amount of coal delivered to this market and none of the industrial plants are suffering, although many of them are known to be drawing on their reserve stocks, which they had hoped to avoid doing until later in the season. The railroads report that their extraordinary efforts to increase their supply of engine fuel have been fairly successful, but even at that they are continuing vigorous measures along this line.

Most operators report their output considerably below capacity, on account of the continued labor shortage, but there is a good tonnage coming in from the many new operations, and some formerly abandoned mines, which have been reopened. While we give below a table of prices it must be understood that they are only approximate, changes occurring almost hourly. The prices per gross ton, f.o.b. cars at mines, are:

Georges Creek Big Vein	$3.10@3.25
South Fork Miller Vein	3.00@3.20
Clearfield (ordinary)	2.75@2.85
Somerset (ordinary)	2.70@2.80
West Va. Freeport	2.65@2.75
Fairmont gas	3.00@3.15
Fairmont gas, mine-run	2.85@2.95
Fairmont gas, slack	2.40@2.55
Fairmont lump, ordinary	2.80@2.90
Fairmont mine-run	2.70@2.80
Fairmont slack	2.40@2.55

BALTIMORE

Market tighest in months. Bituminous around $3 and $3.50. Anthracite dealers hit by car scarcity, and premiums are being paid.

Bituminous—The most exacting market in weeks is facing the coal trade here. With car scarcity so pronounced that all contract business is far back of requirements, the scramble for what free coal that is offering has become acute. Many mines are holding contract deliveries down to the

very minimum of their obligations and are getting big prices for any other coal they can get loaded. At the mines the price for all steam coals ranged around $3 or better, while at tide the sales are generally on a $3.50 mine basis. For deliveries in the future, even within the next ten days or two weeks, from $3.65 to $3.75 is being asked even on small contracts.

Not more than a 60 per cent. car supply is reaching most of the mines. Many big plants are now operating on dangerously small margins, and surplus coal stores are being drawn on to eke out the deliveries on regular contracts that were expected to carry pretty full until much later in the year. Prices to the trade at the mines are now about as follows:

Georges Creek, Tyson, $3.15; Somerset, $3; South Fork, $3; Clearfield, $3; Quemahoning, $3.10; Latrobe, $2.90; Freeport, $2.90; Fairmont gas, ¾, $2.75; mine-run, $2.75; slack, $2.65.

Anthracite—All sizes are scarce here, even in the face of a less urgent demand following warmer weather the early part of this week. Coal men are urging the mines to hurry shipments, but many are finding that the only way to get even approximately the amount of coal desired is to pay premiums for prompt delivery.

The retail coal trade has put into effect the usual 25c. advance customary in October to take care of the added cost of winter hauling. Even with this the payment of premiums and the ever increasing cost of maintenance is making dealers' profits doubtful.

Exports—Exports last week were up to the recent average, a total of 21,691 tons, being loaded for foreign ports. The present week will probably see a big drop because of the submarine raid on Allied shipping.

HAMPTON ROADS

Shortage of coal restricts shipments. Practically all available production needed for contract business. Prices tightening.

Stocks are still small at all of the terminals, which has reduced shipments on practically all classes of business. With the strong demand record business could be done, as consumers under contract are taking all the coal they can get and new inquiries are received from all directions.

A cargo was shipped from Newport News the past week to Twillingate, Nova Scotia, which is typical of the unusual directions from which inquiries are received. Shipping was tied up in Hampton Roads on account of fog, the latter part of last week. One coal-carrying steamer, the British Steamship "Hawkhead," was damaged in collision during the fog; the cargo consisted of some 6,800 tons of Pocahontas for Mejillones, Chile.

Conditions as to supply show no improvement and prices show an advance on every sale reported. Nearly all coal is required for contract business, but there are occasional sales of free coal and all such sales are at very high prices. Loading is still delayed by the small receipts. It is expected that a large portion of the foreign shipping in Hampton Roads will be delayed in sailing on account of the activities of the German U-boat.

Demurrage charges at the rate of $2,000 per day are accumulating against the Norwegian steamer "Waccaman," which was loaded here last week with bituminous coal for Brazil. A difference of opinion has arisen between the shippers and the master of the vessel, the latter claiming that inasmuch as the coal is consigned to order it renders the ship liable to capture on account of not having a definite consignee. The coal is being shipped by the American Export Coal Co.

Coastwise freight rates are somewhat easier, on account of the shortage of coal. Several of the larger schooners are in port seking charters and one of the largest barge owners has tied his fleet up in New York, being unable to obtain business for it. While freights show a softening tendency, it is felt that the condition is only temporary, due to the scarcity of coal.

Conditions, such as obtain at present, tend to show the reliability of certain shippers. Thus it is reported that one large consumer here has had to purchase coal in the open market at an increase of 100 per cent. over his contract mine price, because the shipper with whom he had a contract is unable to make delivery.

Prices at present, subject to change without notice, are: Pocahontas and New River for cargo, $4.75@5; per gross ton, f.o.b. vessel, for local consumption, in carload lots on track, $4@4.25; for bunker delivery, $5@5.25 per gross ton plus 10c. per ton trimming.

High-volatile coals are in good demand also. Anthracite has not advanced beyond the circular of $7.50 per net ton delivered, though the regular winter advance is scheduled for Nov. 1.

Railroad Tonnages—The following is a comparative statement of the tonnages handled by the different roads for the weeks ended Oct. 7, 1915-16, and for the first 15 weeks of the last half of the years:

	Week		15 Weeks	
	1915	1916	1915	1916
Nor. & West...	140,934	136,922	2,649,578	2,371,031
Ches. & Ohio..	93,344	77,961	1,406,257	1,401,057
Virginian.....	65,150	.....	1,014,297	.....
Total.....	299,428	.....	5,070,132	.....

Ocean Shipping

VESSEL CLEARANCES

The following vessels have cleared with coal cargoes during the past week:

NORFOLK

Vessel	Destination	Tons
Bessie Whiting[4]	San Juan, P. R.	712
General Salsa[1]	Porto Vecchio, Italy	4,076
Argo[6]	Havana, Cuba	2,193
Nepos[5]	Guanoco, Venezuela	3,922
Van Lear Black[11]	Pernambuco, Brazil	848
Winifredian[3]	Bahia Blanca, A. R.	7,010
Queen of Scots[3]	Montevideo, Uruguay	2,040
Eva B. Douglass[4]	San Juan, P. R.	1,612
Curaca[3]	Iquique, Chile	1,046
Seward[4]	San Juan, P. R.	3,943
Hawkhead[7]	Mejillones, Chile	6,838
Pietro[1]	Genoa, Italy	1,780
Colombia[1]	Cartagena, Colombia	263
Iolanthe[8]	Buenos Aires, A. R.	3,792
Bjornefjord[9]	Rio de Janeiro, Brazil	4,989
Armando[10]	Italy—Any port	7,117
Oxonian[8]	Bordeaux, France	895
Athaulpa[9]	Maranham, Brazil	50

NEWPORT NEWS

Clothilde Cuneo	Twillingate, N. F.	1,077
Frontera[5]	Kingston, Jamaica	751
Malm[2]	Cayo Francis, Cuba	1,737
Edward Pierce[2]	Antilla, Cuba	6,432

PHILADELPHIA

Rodfaxe	Antilla	
Mar Adriatico[2]	Tarragona	
Thelma	St. Johns, N. F.	846
Prydwen	Manzanilla	
William Cobb	Halifax, N. S.	356
Laura C. Anderson	Marseilles	1,600
Rio Verde	Rio Janeiro	

BALTIMORE

Holly Branch	Uruguay	4,988
Wilhelm Colding	Costa Rica	2,136
Polaria	Ecuador	4,821
Finland	Argentina	2,500
Monkshaven	Argentina	4,605
Sangstad	Cuba	1,805
Edward H. Cole	Spain	836

[1] Pocahontas Fuel Co. [2] Berwind-White Co. [3] Castner Curran & Bullit. [4] Baker-Whiteley Co. [5] Smokeless Fuel Co. [6] West Virginia Coal Co. [7] W. C. Atwater & Co., Inc. [8] Northern Coal Co. [9] C. & O. Coal & Coke Co. [10] C. H. Sprague & Son. [11] Jno. D. Leitch.

OCEAN FREIGHTS

Since our last report but few steamers were chartered for export coal, and none of these fixtures reported. During the latter part of last week the market was drifting in charterer's favor but the sinking of a number of steamers by a German submarine off our coast will undoubtedly have a decided effect upon the freight market, and quotations we give below are subject to change on that account.

We would quote freight rates on coal by steamer as follows:

	Oct. 2	Oct. 9
West Coast Italy....	$25.20@26.40	$26.40@27.60
Marseilles.....	22.80@24.00	24.00@25.20
Barcelona*?.....	20.40 about	21.60 about
Montevideo.....	13.20 about	13.20 about
Buenos Aires.....	13.20 about	13.20 about
Rosario.....	14.40 about	14.40 about
Rio Janeiro.....	11.75 about	12.00 about
Santos.....	12.00 about	12.50 about
Chile (good port)....	9.00@10.00	8.50 about
Havana.....	3.50@4.00	3.50@4.00
Cardenas, Sagua.....	5.00 about	5.00 about
Cienfuegos.....	4.50@5.00	4.50@5.00
Port au Spain.....	6.00@6.50	6.00@6.50
St. Lucia.....	6.00@6.50	6.00@6.50
St. Thomas.....	5.25 about	5.50 about
Barbados.....	6.00@6.50	6.00@6.50
Kingston.....	4.50 about	4.50 about
Curacao[1].....	5.75 about	5.50 about
Santiago.....	4.75 about	4.50@5.00
Guantanamo.....	4.50@5.00	4.50@5.00
Bermuda.....	4.50@5.00	4.50@4.75
Vera Cruz.....	5.50@6.00	5.50 about
Tampico.....	5.50@6.00	5.50 about

* Spanish dues for account of cargo. [1] And p.c.
[2] Or other good Spanish port.

W. W. Battie & Co.'s Coal Trade Freight Report.

Note—Charters for Italy, France and Spain read: "Lay days to commence on steamer's arrival at or off port of discharge."

COASTWISE FREIGHTS

Marine freights are sentimentally weak, although "asking" quotations are not materially changed. Barges that ordinarily fare to Hampton Roads are seeking cargoes in New York and Philadelphia, and until the Southern shippers are easier on coal there is not likely to be any strength to the demand for tonnage from that quarter. Charters are understood to have been made at $1.65@1.75, Norfolk to Boston, on fair-sized capacity, and to Providence and New Bedford at 15@25c. less. Two or three large sailing vessels that were casting about for coastwise charters have been fixed for further business off-shore.

As high as $1.35 has been paid from New York to points on Long Island Sound, with no slackening in demand. As long as the rush for hard coal continues these rates are likely to remain firm; $2.50 is quoted to Kennebec River points.

OCEAN CHARTERS

Coal charters have been reported as follows during the past week:

PHILADELPHIA

Vessel	Destination	Tons	Rate
Fallac	Mexico	1,103	

BALTIMORE

Monkshaven	River Plate	2,097	
Polari	Ecuador	2,252	
Tremeadow	River Plate	2,335	
Holly Branch	River Plate	2,215	
Wilhelm Holding	Port Limon	931	

VIRGINIA

Nankai Maru[1]	Chili	3,597	$9.60
Kysdelfjord	Rio Janeiro		
Sverre	Rio Janeiro	2,326	
Vadrli[2]	River Plate	3,662	[3]13.80
Bjornefjord	Rio Janeiro	2,337	12.50

ATLANTIC RANGE

Sen. Salusbury Antigua

[1] Or November. [2] Ex-Arborean. [3] And coke $20.40.

SHIPPING NOTES

Long Island, Maine—The two-masted schooner "C. B. Clark," while en route from New York to an Eastern port laden with a cargo of coal, ran aground on the south side of outer Long Island, Maine, during a storm and has been abandoned.

New York—Information has been received here from Halifax, N. S., that the schooner "Ravola," from Perth Amboy, with coal, has sprung a leak while unloading her cargo at destination and sunk to the bottom of the wharf.

Norfolk, Va.—The Norwegian motorship "Brazil" is to load a cargo of 4,500 tons of coal at Norfolk for the American naval station at Tiburon, Calif., for the United States government.

Lake Markets

PITTSBURGH

Heavy demand from East, with fancy prices frequently paid. Prospects for consumption excellent. Car shortages interfere somewhat with production.

There has been insistent demand for coal from the East, fancy prices being frequently paid on fair-sized lots for immediate shipment. The market is quite irregular as regular consumers tributary to the district refuse to pay such prices. It is stated that as high as $3 per gross ton has been done for Fairmont coal and about $2.75 per gross ton for Pittsburgh coal. In conservative circles, however, these prices are regarded as exceptional and as having no important bearing upon the regular market. Evidence is accumulating that too much is being made of high-priced sales, the tonnages involved being exaggerated. The market has not stiffened in the past two or three days, but is sensibly stronger than a week ago.

The coal consumption by the steel industry is at record rate, with every prospect that it will increase gradually as additional steel making and finishing capacity becomes available. The steel interests expect to be fully employed not only through the first half of next year, but probably through the entire year. The tin plate and sheet mills are opening their books for sales over the first half of 1917 and insist that the business will consist simply in allotting tonnages to their regular customers, there being not enough capacity to meet the entire demand, and these industries consume particularly large tonnage of coal per ton of steel produced. Steel for tin plate is heated to redness six times in course of manufacture.

There is hardly any interest in contract coal but a fair amount of business will probably come up shortly. Cars are scarce but no large amount of production is being lost in consequence. Labor supply is about the same as formerly. We quote prompt coal as follows: Slack, $1.75@2; mine-run, $2.10@2.30; ¾-in., $2.20@2.30; 1¼-in., $2.30@2.40, per net ton at mine, Pittsburgh district, with higher prices sometimes paid.

BUFFALO

The already strong market becomes still stronger. Not enough coal of any sort. Prospect of continued shortage. Men and cars wanted.

Bituminous—The stringency of the market grows more intense from week to week. Jobbers are growing uneasy, but the consumers are only mildly interested and then only when their contracts fail to be filled. The single-order trade is not brisk, even when it is known that it is al-

most impossible to get a car for special shipment. As a rule the mines refuse to make prices and are confining themselves to filling contracts.

There is an increasing complaint of car shortage and every mine is sending out scouts looking for more miners. The odd feature of the trade is the fact that the consumer is not stocking up to any extent, seeming to be of the opinion that there will be no real scarcity.

There are sales of coal in practically all districts from which Buffalo draws her supplies as high as $3 at the mines for three-quarter, but it is generally agreed that such prices are not paid here, though the market is very strong at former figures, as follows:

	Pittsburgh	Allegheny Valley	Penn Smokeless
Lump	$2.95	$2.75	$2.80
Three-quarter	2.85	2.60	....
Mine run	2.75	2.50	2.60
Slack	2.40	2.30	2.60

Prices are per net ton, except east of Rochester and Kingston, Ont., where they are per gross ton.

Anthracite—Shortage of coal continues. Shippers report that 1,200 cars are wanted to fill existing orders in this district and it is said that other markets are in the same condition. The price of independent anthracite is more than $1 extra now for chestnut, with a rising tendency. For some reason consumers held off through the summer and then began to buy a month earlier in the fall. The difficulty comes from inability to get the coal mined and shipped promptly.

The Lake business is not heavy, as so much coal is absorbed by other branches of the trade. Shipments for the week were 78,135 tons, of which 23,700 tons cleared for Chicago, 6,000 tons for Green Bay, 7,000 tons for Waukegan, 3,100 tons for Gladstone and 32,500 tons for Duluth and Superior. Shipments for September were 328,010 tons and for the season to October, 1,042,161 tons. For the same time last season the shipments were 2,792,075 tons.

Freights on single charters are 80c. to $1 per net ton to slow Lake Michigan docks and 55 to 75c. to fast ones. Lake Superior rates have advanced to 50c. About three-quarters of the coal is shipped on contract, at last season's rates, 30c. to Lake Superior and 45 to 60c. to Lake Michigan.

The leading anthracite companies maintain regular prices, in spite of the premium on independent coal, the circular being as follows, per gross ton:

Grate	$5.85	Chestnut	$6.35
Stove	6.10	Pea	5.00
Egg	6.10	Buckwheat	3.50

Prices are all f.o.b. cars, with 25c. per ton additional for delivering on board vessel.

TORONTO, CAN.

Trade active. Stocks becoming exhausted, owing to slow deliveries. Prices for bituminous advanced.

Trade is steady with an active demand for both hard and soft coal. Owing to car shortage very little coal is coming forward, and stocks in all the yards are running low. Dealers do not anticipate any improvement in deliveries for some weeks.

Prices for bituminous have advanced, quotations for best grades per short ton being as follows: Retail anthracite egg, stove and nut, $8.50; grate, $8.25; pea, $7.50; bituminous steam, $5.85; slack, $4.85; domestic lump, $6; cannel, $8. Pennsylvania smokeless, $6; slack, $5. Wholesale, f.o.b. cars at destination, bituminous three-quarter lump, $4.50; slack, $3.65; Pennsylvania smokeless lump, $5; slack, $4.

DETROIT

Difficulty is experienced in getting steam coal. Domestic grades scarce. Lake shipments curtailed by car shortage.

Bituminous—Wholesalers and jobbers are having trouble to supply the requirements of their customers for steam coal. Stock is not always easy to obtain and prices are so erratic that unusually careful investigation of the market is necessary. Quotations offered are conceded to be below the market. Nut, pea and slack quoted at the mines as $1.50 is reported to be bringing from 10 to 50c. more on actual sales. Three-quarter lump, with a quotation of $2 at the mines is unobtainable at that figure. Mine-run, also is said to be bringing more than $1.75@2, the quoted figures.

Domestic stock is even more scarce, while consumers excited by newspaper stories of short supply are deluging retail dealers with orders and requesting immediate delivery. There is some Jackson Hill domestic lump available and it is quoted at $2.75 at the mines. Hocking domestic lump at the same price is almost impossible to obtain, while West Virginia lump quoted at $2.25 is also reported very scarce. Smokeless coal is practically out of the market.

Anthracite—Shortage of cars on Eastern roads and frequent embargoes on the Grand Trunk R.R., over which considerable anthracite is brought to Detroit, have cut down the available supply quite materially. Household consumers are urging delivery and retail dealers are far behind in making their distribution. Wholesalers are experiencing considerable difficulty in getting stock to fill orders; in some cases buyers have offered premiums of $1 or more to get coal.

Lake Trade—With the movement of coal hampered by car shortage the supply is not sufficient to provide cargoes even for all the carriers under season contract. Many of them are making the upbound trip without cargo. Coal not covered in contracts is being placed for shipment to ports on Lake Superior at the rates stipulated in contracts closed early in the year. Coal to be moved to Lake Michigan docks, takes a higher rate, however, the amount being determined by the dispatch in unloading. Cargoes to Milwaukee are paying 75c.

The slower movement of coal by the Lake routes is reflected in the report of the St. Mary's River Canals for September which shows 303,887 tons of anthracite and 1,872,078 tons of bituminous coal were carried through those waterways during the month. The movement in August was 322,136 tons of anthracite and 2,424,941 tons of soft coal. In September, 1915, shipments through the canals were 174,560 tons of anthracite and 1,553,436 tons of bituminous.

CLEVELAND

Prices increasing almost daily. Steam plants running to full capacity and calling for full contract requirements. Eastern and Western markets buying in larger quantities. Railroads placing embargoes on movement of cars off their lines.

There is just about enough coarse coal coming into the Cleveland market to take care of the demand for this grade of coal, but slack still increases in price almost daily with the gradual decrease in production. The market is not calling for any more of this grade than heretofore, but various conditions have cut down the production to such an extent that today there is only a 50 per cent. supply available.

Practically all steam plants are running to full capacity calling for full contract requirements, which keeps the price of coarse coals at a very high figure. The continued high temperature has kept the retail man out of the market to a certain extent and a few days of cold weather will tend to boost prices still higher.

Fine coal from the Hocking and Pomeroy districts has been a little freer the last few days than for some weeks.

The middle district coals from Goshen, Coshocton and Salineville districts, taking the low freight rate into Cleveland, are being sold at the same delivered price as the No. 8 and Cambridge grades.

Western markets are beginning to buy larger quantities of anything they can get, and the Eastern market, especially Buffalo, is taking every pound of surplus coal which has a rate into Buffalo and the Junction points east of there.

The Baltimore & Ohio R.R. has published a $1.25 rate from points in Ohio to Buffalo and Black Rock, effective Nov. 11, 1916, coal traveling via Baltimore & Ohio and Erie R.R. to those points. This rate is the same that coal takes from Ohio mines on the Pennsylvania and Wheeling & Lake Erie R.R. But the car situation is in such terrible shape today that the Wheeling & Lake Erie R.R. has placed an embargo on its equipment preventing it leaving its lines. The fear of embargoes on coal going East has already been felt as shown by the reluctance of Eastern shippers to even make a bid on coal on days when rumors were heard that embargoes would be placed.

Prices for spot coal in Cleveland are increasing every day and the following is only approximately the market:

	Three-quarter	Mine-run	Slack
No. 8	$3.50	$3.40	$3.25
Cambridge	3.50	3.40	3.25
Middle Dist.	3.50	3.40	3.25
Hocking	....	....	3.25

No quotations can be made on Youghiogheny, Pittsburgh, Pocahontas and Fairmont grades.

COLUMBUS

Higher prices and a growing car shortage the distinctive features of the trade. Buyers urgent for immediate shipment.

With the car shortage more pronounced than formerly and an insistent demand for all grades, the coal trade has developed much strength. It is a strenuous time for operators and retailers are also having their share of troubles. Prices at the mines have again advanced and the end is not yet in sight. It is a runaway market and a coal famine is threatened in many sections.

Domestic trade is probably the strongest feature of the industry. Dealers stocks are quite short and they are unable to replenish them at this time. Householders are asking for coal and dealers are unable to furnish it. Retail prices are strong with Pocahontas lump selling at $5, West Virginia varieties at $4.25@4.50, while Hocking lump is selling at $4. Anthracite quotations have also advanced.

Steam business is also active and consumers are urging shipments. Some of the larger consumers have been compelled to curtail activities because of shortage of fuel. Railroads are taking a large tonnage while public service corporations are short of supplies and city and county officials are unable to secure bids on coal supplies for the winter. The Chicago market is strong after both domestic and steam grades.

The circulars are again advancing and prices are about anything within reason if shipment can be made. Many of the operators are booking orders at the prices prevailing at the time shipment is made. The car supply is from 40 to 60% in most fields. The Hocking Valley Ry. is in the best shape and operators along that line have been well supplied with equipment until quite recently. The output in Ohio fields is about half of normal.

Prices on short tons, f.o.b. mines are as follows:

	Hocking	Pomeroy	Eastern Ohio
Rescreened lump	$2.85	$3.00	.....
Inch and a quarter	2.50	2.75	$2.65
Three-quarter inch	2.50	2.75	2.65
Nut	2.25	2.40	2.40
Egg	2.25	2.40	.....
Mine run	2.75	2.50	2.30
Nut, pea and slack	1.90	2.00	1.90
Coarse slack	1.80	1.90	1.80

CINCINNATI

Demand active, with little spot coal offered and higher prices in evidence. Car situation serious.

In spite of continuous mild weather the market is getting steadily stronger, as dealers and large consumers realize the difficulty of getting coal, and the probability that this will be accentuated as the season advances. The extremely small amount of spot coal available is on of the most significant factors, and what little there is, especially in the steam grades, is snapped up at the holder's price.

Nut and slack is especially strong, and commands record prices, as industrial activity is at a high point, and steam fuel is an absolute necessity, regardless of price. Retail dealers are anxiously combing the market for coal to stock their yards for the cold weather demand, and as operators are none too anxious to sell, the natural result is a strong and advancing market. Complaints regarding the inadequacy of the car supply are growing more general, the West Virginia districts especially suffering on this score.

LOUISVILLE

Kentucky operators 30 to 40 days behind on shipments. Sales limited to immediate deliveries and largely to regular customers. Limit price likely to be established.

With Kentucky operators averaging more than a month behind on shipments and no prospects of the car shortage improving Louisville operators are predicting that eastern Kentucky block will go to $3 a ton, f.o.b. the mines before the end of October. It is stated that leading operators are considering fixing a maximum limit on the prices they will quote to their regular customers, who are now generally being given the preference on such block orders as are taken. One operator said that he would be willing to take orders for a few cars of block at $2.75, f.o.b. the mine, for shipment after the middle of December, which is the earliest moment he expects to have any free tonnage.

An important eastern Kentucky operator stated that he was selling block regularly to jobbers at $2.60 per ton, f.o.b. his mines. In western Kentucky the situation is much the same. Eastern Kentucky prices, f.o.b. the mines, long ton basis, may be quoted as follows: Block, $2.60@2.75; 2x4-in. egg, $2.25@2.35; mine-run, $2, including No. 2 or straight; nut and slack, $1.60@1.75.

BIRMINGHAM

Prices continue to advance. Demand insistent. Shortage of equipment prevents increased production or movement.

No steam coal can now be secured for less than $2@2.50 mines, and little free coal is available in the district. Quotations are practically out of order, and such business as the supply will permit to be booked can be had at most any figure the broker or operator has the temerity to ask. Sales are being made at 90c. to $1 per ton above quotations of two weeks ago on steam grades, and domestic coal has also scored considerable advance during this period. Most all domestic mines are sold up through October.

The car situation continues serious and there can be no increase in production until more equipment is furnished by the railroads. Transportation officials offer no hope of an early amelioration of these conditions.

DALLAS, TEX.

The closing of the Texas and Kansas coal mines, coupled with industrial unrest everywhere and the shortage of freight cars, has caused a scarcity of coal in Texas and a consequent marked advance in prices. Some Dallas coal dealers report that they find it absolutely impossible to secure coal to fill their orders. The McAlester Coal Co. reports that shortage of cars makes it impossible for this company to get ample supply of coal from the McAlester mines in Oklahoma. The price of McAlester lump has advanced $1 a ton since Sept. 1, and it is announced that another advance of 50c. a ton will be made effective Oct. 15, making the price $8.50 a ton.

Coke

CONNELLSVILLE

Higher prices for spot furnace coke. Buyers interested in first-half contracts but proceeding cautiously. Foundry coke stronger.

Last Friday one lot of 25 cars and several smaller lots of furnace coke for spot shipment were sold at $4.25, establishing a new record high price on this movement. This week the market stands at the same level, though with a light turnover thus far. There are the usual reports about certain buyers having withdrawn from the spot market, but there have been similar reports all through the year, always followed by a stronger and not a weaker market.

About one-third the coke that is to be bought for next year is now under negotiation, but the prospective buyers are slow about closing. They are willing to pay a fair price but they profess to see, in the recent rapid increases in asking prices, an effort to stampede them, and thus they are proceeding leisurely. While it is accepted that coke is to be more or less scarce for some time to come, there are many who believe the present developmnts simply represent a flurry. There is a rumor that $3.50 has been done on a first-half contract, but this lacks adequate confirmation. Foundry coke is in fair demand and is somewhat stronger on account of the high prices paid on odd lots of furnace coke. We quote: Spot furnace, $4.25; contract, $3.25; spot foundry, $4; contract, $3.50@3.75, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Sept. 30 at 412,364 tons, an increase of 7,764 tons, and shipments at 421,196 tons, an increase of 2,768 tons.

Chicago—The coke market has been featured during the past week by sales of spot coke as high as $6, whereas the circular price is $4.90. This business, of course, is very limited, since there is but a minimum amount of free coal to offer. All grades are hard to obtain, and the same influences that control the bituminous market apply at the present time to the coke trade. Nominal prices per net ton, f.o.b. cars Chicago, are as follows:

Connellsville	$6.00@6.25
Wise County	6.00@6.25
Byproduct foundry	6.00@6.25
Byproduct domestic	5.50@5.75
Gas house	5.00@5.50

Middle Western

GENERAL REVIEW

Feverish buying continues. Prices reach new high levels. Further shortening of car supply noticeable. Weather mild.

The urgent demand for coal at high prices continues unabated, and in some cases quotations have moved to still higher levels. Excited buying has been prevalent at times during the week, notwithstanding mild Indian-summer weather. But little free coal from any district has been available. Many country dealers have been making visits to the mines and jobbing centers in an effort to get a few shipments forwarded promptly. Most Indiana and Illinois mines are 60 days behind in their orders.

The Western coal trade has not seen such activity as has prevailed for the last three weeks in 25 years, but at the same time it is experiencing great difficulty in taking full advantage of the situation, owing to car shortages, slow transportation and lack of labor. The railroads are making every effort to obtain prompt unloading of equipment. No break has occurred in the price of screenings. A large buyer in Chicago is reported this week to have covered his requirements up to Jan. 1 at a price of 90c. Household consumers have become anxious by newspaper reports of a shortage of supply, and have been flooding retailers with orders. Retail yards are generally far behind on deliveries. No cessation has occurred in the demand for domestic sizes, and coarse steam sizes are absorbed as fast as produced. It is freely predicted by conservative operators that the market is headed toward levels not seen since the anthracite strike of 1902. Offerings of Eastern and Southern domestic coals are scarce and at figures far in excess of those ruling last year.

The Northwestern situation is extremely firm. Anthracite coal is short at the docks, and buyers of Lake coal find it difficult to get immediate delivery. There seems to be little doubt that supplies on the docks will be wholly used up before spring, unless there should be a remarkable slump in consumption or a very mild winter. Shipments of Indiana and Illinois coals are going forward to Northwestern points in greatly increased quantities and at high prices.

CHICAGO

Retailers make panicky efforts to cover needs. Free coal very short and sold at new high levels. Public scrambling to cover requirements. Steam coals strong.

Two dollars and twenty-five cents is now the price on Franklin and Williamson County lump, furnace and small egg, with No. 2 stove bringing $2. Screenings are averaging $1 and are very scarce. Williamson County washed sizes are running from 10c. to 25c. higher than heretofore. There is no coal on track unbilled at the southern Illinois mines. Tonnage hoisted at the Franklin County mines in the month of September was 956,540 tons. But little free coal is available, so that the new prices are mainly nominal because of the small amount of business done under them. Mine-run from southern Illinois mines is averaging from $1.40 to $1.50, with an upward tendency noted.

Springfield screenings were a little easier early this week, but toward the end became stronger, averaging 95c. Mine-run is being sold freely at $1.40. Free lump coal is scarce and what little spot lump is sold brings $2.15.

Quotations in the Chicago market are as follows, per net ton, f.o.b. cars mines:

	Wilms. and Frank. Cos.	Springfield	Sullivan Co.	Clinton	Green and Knox Cos.
Lump	$2.25	$2.00	$1.75@1.90	$2.00	$2.00
Steam lump	.....	1.50@1.60	1.60@1.70	1.40@1.60	1.40@1.50
2½ and 3-in. lump	.....	.....	1.75@1.85	.....	1.60@1.75
1¼-in. lump	.....	.....	1.40@1.60	1.40@1.60	.....
Egg	2.25	1.85@2.00	1.65@1.75	1.65@1.90	1.80@1.90
Nut	.....	1.75@1.85	1.35@1.50	1.40@1.50	1.50
No. 1 washed	2.00@2.25	.....	.....	.....	.....
No. 2 washed	1.85@2.00	.....	.....	.....	.....
No. 1 nut	2.25	.....	.....	.....	.....
No. 2 nut	1.85@2.00	.....	.....	.....	.....
Mine-run	1.35@1.50	1.25@1.35	1.25@1.30	1.25@1.35	1.25@1.30
Screenings	1.00@1.10	.85@ .90	.90@ .95	.95@1.10	1.00@1.05

	Saline and Harrisburg	E. Kentucky	Pocah. and W. Va. Smokl.	Penn. Smokeless
Lump	$2.00@2.25	$2.65@3.25	$2.75@3.25	$2.75@3.00
1¼-in. lump	1.40@1.65	.....	.....	.....
Egg	2.00@2.25	2.00@2.60	2.75@3.25	2.75@3.00
Nut	2.00@2.25	1.75@2.50	2.00@2.50	2.00@2.50
No. 1 washed	2.25	.....	.....	.....
No. 2 washed	2.00@2.25	.....	.....	.....
Mine-run	1.35@1.50	1.30@1.35	2.25@2.50	2.25@2.50
Screenings	1.00	.....	.....	.....

Kanawha splint, $2.25. Hocking lump, $2.75.

The car shortage at Indiana mines grows worse rather than better, notwithstanding a slowing up in the demand for domestic coal due to a temporary revival of mid-summer weather. Indiana and Chicago retailers have from 10% to 15% less coal stored for domestic use than at this time last year. Prices, which are now 25c. a ton higher than last month, will again be advanced on or about Oct. 15. Fourth vein Indiana lump is now bringing $2 and shippers are not anxious for business at this figure. The strike at the Vandalia mines is helping to maintain the high price on steam coals. Very little free domestic coal is available for shipment from Knox County mines.

The upward tendency of the smokeless market has not been retarded. Sales of mine-run have been made as high as $2.50, with every indication that that figure will be exceeded very shortly. Spot shipments are rare, so that the excited demand is causing fictitious prices to be quoted. On lump and egg retailers have been anxiously bidding for tonnage, offering as high as $3.50 for first grades.

Premium prices prevail on all spot shipments of Hocking. Stocking of Hocking lump by retailers under contracts is reported, and Lake shipments were very heavy the last week. Kentucky shipments are light with prices still advancing on free coal. Domestic lump has been quoted as high as $3.50 f.o.b. cars at mines. The splint situation is exceptionally strong, 1¼-in. lump commanding $2.25 at the mines.

The shortage of anthracite is causing former consumers of hard coal to substitute Western bituminous grades. Despite this expedient, the demand for anthracite is about as heavy as in former years, due largely to delayed ordering. Anthracite shipments are very backward. Runaway prices have been quoted by some of the independent producers in Western territory. Orders for quick delivery are becoming exceedingly difficult to place, and many disappointments are being experienced by retailers endeavoring to secure prompt shipments to fill bins.

General Statistics

IMPORTS AND EXPORTS

The following is a comparative statement of coal imports and exports of the United States for July, 1915-16, and for the 7 months ended July, 1914-15-16, in long tons:

	July		Seven Months		
Imports	1915	1916	1914	1915	1916
Anthracite, total	2,069	37	15,902	2,313	4,513
Bituminous, total	112,166	122,273	758,044	835,222	942,631
United Kingdom	680	322	8,258	15,410	5,066
Canada	91,932	103,819	588,904	673,864	864,714
Japan	9,480	16,150	30,983	46,379	55,530
Australia	9,574	1,782	128,018	96,993	15,966
Other countries	500	200	1,881	2,576	1,355
Coke	3,657	3,875	61,715	24,389	36,840
Exports					
Anthracite coal	270,651	390,078	2,211,664	1,995,262	2,453,466
Canada	267,712	386,049	2,175,407	1,968,404	2,396,186
Argentina	.....	400	.....	595	1,395
Brazil	.....	327	.....	43	428
Uruguay	.....	.....	.....	5	.....
Other countries	2,939	3,302	36,257	26,215	55,457
Bituminous total	2,229,065	2,032,018	7,090,084	8,590,307	10,078,087
Italy	502,750	211,718	.....	1,641,791	1,216,684
Canada	1,016,413	1,299,906	4,525,830	3,790,586	6,212,673
Panama	52,805	24,075	168,898	280,027	209,139
Mexico	16,708	7,165	190,363	200,309	117,562
Cuba	91,162	117,949	616,574	620,237	724,547
West Indies	43,959	29,170	355,274	266,258	291,912
Argentina	114,162	115,591	112,408	533,891	528,199
Brazil	84,813	57,566	100,530	429,969	433,185
Uruguay	26,689	20,366	45,594	99,834	89,644
Other countries	279,604	148,512	974,613	727,405	554,542
Total coal	2,499,716	2,422,096	9,301,748	10,585,569	12,831,553
Coke	69,845	57,377	408,441	430,624	594,992
Bunker coal	712,872	722,681	4,525,876	4,354,019	4,439,759

Foreign Markets

GREAT BRITAIN

Sept. 28—Contrary to expectation, the near approach of the end of the month has produced no easiness in the coal position. The demand is still as heavy as ever, and prices rule strong.

Best Welsh steam	Nominal
Best seconds	Nominal
Seconds	$11.28@11.52
Best dry coals	10.20@10.80
Best Monmouthshires	11.28@11.52
Seconds	10.56@10.80
Best Cardiff smalls	7.20@ 7.80
Cargo smalls	5.40@ 6.00

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

Freights—There has been no change worthy of note in the freight market. Rates in some directions have been somewhat patchy, but generally the tone is quiet.

Gibraltar	$6.24	Port Said	$14.40
Genoa	14.40	Las Palmas	6.60
Naples	14.40	St. Vincent	7.20
Alexandria	15.00	River Plate	7.20